DECEMBER, 1961

DEC 2 8 1961
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Modern Metals

Extrusion CONTEST WINNER

Good promotional idea for aluminum could be made better by offering cash prizes; broadening it to include sheet, castings, other forms (see p. 28).

now . . . AJAX "CONTOURED" HOLDER BLO
for a LONG HEAD START ON YOUR NEXT

Here's a brand new Ajax service that's destined to
your holder block procurement habits. Ajax can nov
machine blocks to your specifications at a fraction
it has cost you to
your own plant .
"contouring" pl
your disposal the
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flame cutting an
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halfway there,
tying up you
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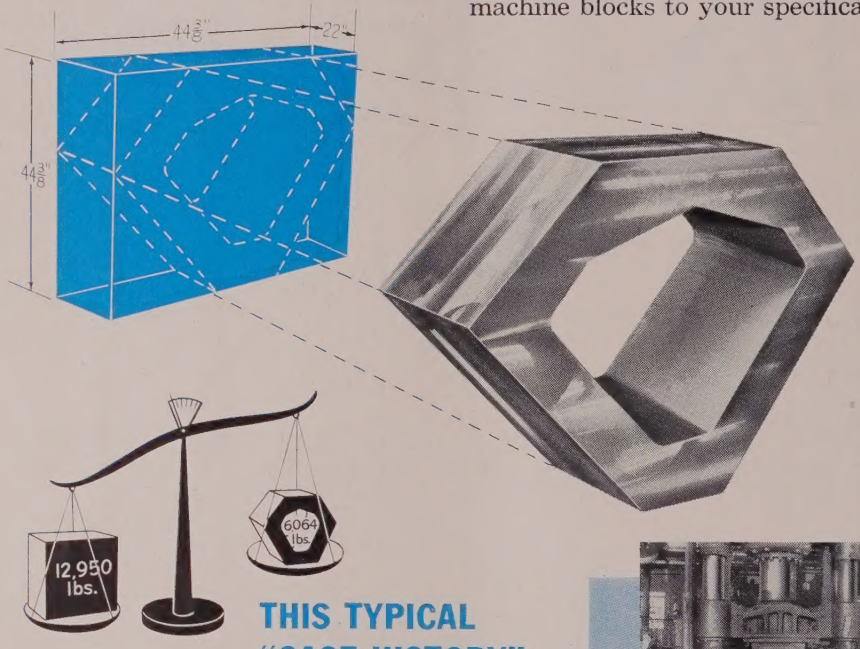
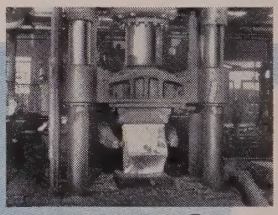
handling needle
weight.



THIS TYPICAL "CASE HISTORY" TELLS THE STORY

Before we developed the "Contour" program, we had supplied a customer with the usual straight rectangular block to finish 21¾" x 44" x 44". Heat treated, and milled on all six sides, to 22" x 44⅜" x 44⅜", it weighed 12,950 lbs., and at $0.30 per lb., cost him $3,885.00 . . . . . In September 1961, we did this job again, the "contoured" way. The customer ordered the holder block flame trimmed and rough milled to his drawing. The rough forged block cost him $3,600.00 at $0.30 per lb., flame cutting cost him $200.00, and extra milling—eight sides versus six before—$150.00, for a total cost of $3,950.00. . . . . Net difference over the cost of the earlier block was $65.00, or a fraction of what it had cost the customer to rough machine in his own shop, not to mention the added benefits of handling about half the weight—6,064 lbs.—and freeing up his facilities for other work. Finally, the second block was superior to the first, because heat treat AFTER rough finish resulted in better penetration—uniform hardness where it was needed.



AJAX

"CONTOURING" SE
INVOLVES SIX S

1. forging the block
2. milling all sides
3. flame cutting where poss
4. rough milling the cavity
5. heat treat after shaping
6. ultra-sonic inspec that all-important control.

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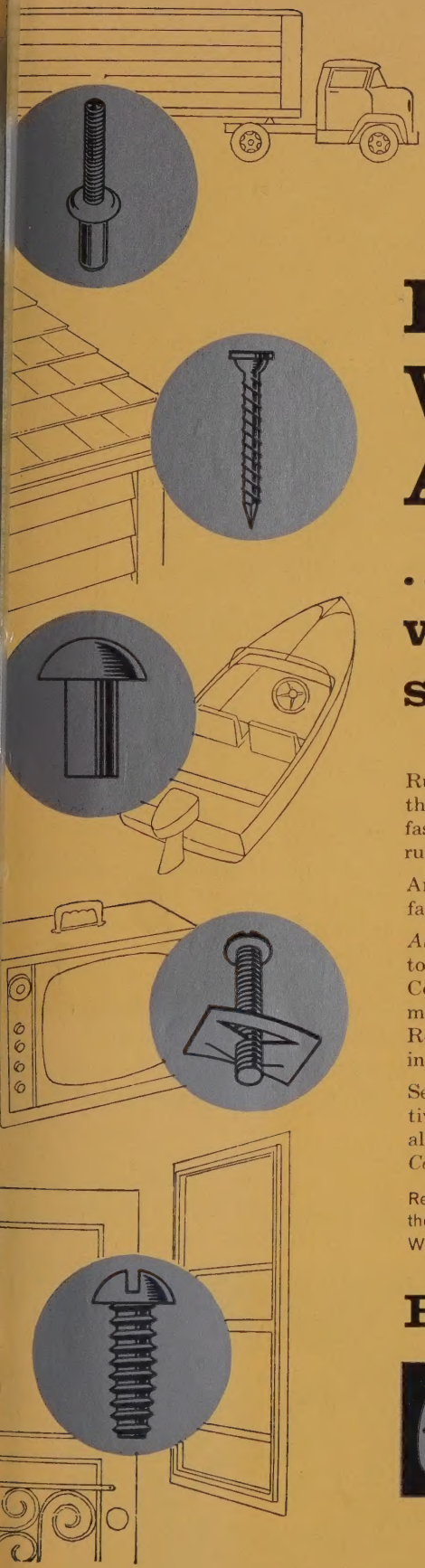

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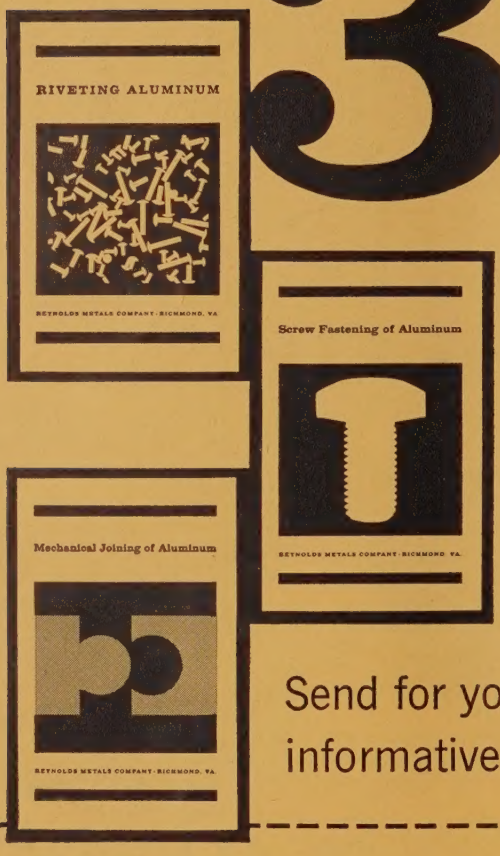
aluminum fastening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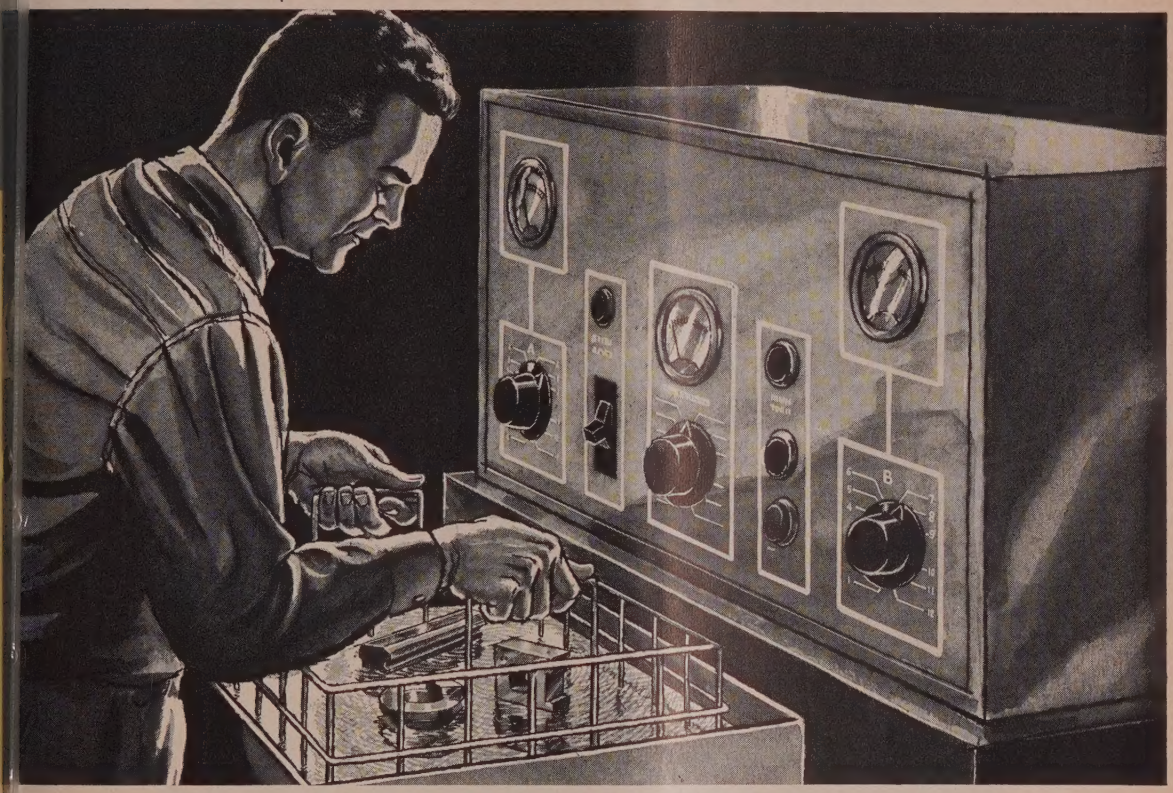

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ETALS
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IE COVER: To make decorative for casual furniture, just slice ¼-afers" off the extruded aluminum ıape, bend them into the patterns ıt, bind them together with clips, ach them to the furniture frames. deceptively simple, but the people ought up the idea copped first prize category of the Aluminum Associa-irst extrusion design contest. For on this and other entries, see our e report starting on page 28.

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Modern Metals

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JOINING MAGNESIUM, PART 3 64
Mechanical fastening and protection of magnesium joints are covered in this concluding installment.

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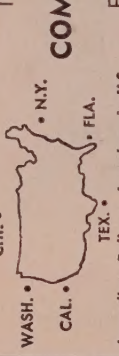

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Letters

Man-of-Year?

Sirs:

. . . . I know you'll pick someone from the steel industry because they're showing the aluminum outfits some mighty fine tricks these days. One is how to make money at a reduced operating rate. . . .

"J" — New York

Sirs:

. . . . Your man of the year should be a banker. They've put up all the aluminum expansion money.

They had either great courage or money to burn, so give them credit. . . .

"M" — Ohio

Sirs:

If Modern Metals is going to nominate a man of the year again, why not somebody at Sears Roebuck? They are the world's biggest aluminum user and they also do a great merchandising job.

"P" — Illinois

Sirs:

Re your man of 1961 feature, have you ever thought of honoring an equipment manufacturer, or even someone who makes materials for the light metals industry?

"O" — Pennsylvania

MM—As usual, we look and listen until the very last minute. Then we panic.

This year we now have it down to two. To give you a clue, we'll say it'll be about a man and his company, or something like that.

Price Cuts

Sirs:

After reading the reader response on the aluminum price cuts, I wonder how you react to the new lower prices for billets . . . ?

"J" — New York

Sirs:

. . . . do you still believe that primary aluminum ingot will go down to the world price next year . . . . ?

"P" — Massachusetts

MM—One thing we know for sure is that the stock market didn't like it during the second week of December.

Hard to figure reasons and trends right now because there are times when some members of the industry seem to panic overnight, then wonder if they did the right thing a week later. We believe that the billet price reduction is a good indication of the trend, however. Sooner or later a "floor" must be reached to stabilize the aluminum market. Certainly the trend, if there is one, is moving toward a one-world price.

For some thoughts on the new billet prices see our "Looking Ahead" page in this issue.

Belt Grinding

Sirs:

We would appreciate any information you can give us in regard to belt speeds and grit sizes for finishing nonferrous metals such as aluminum, brass, bronze, stainless steel, etc.

We have purchased a Yates No. 430 belt sander and have thought to use a 4" wide x 168" continuous belt in the finer grits such as 180, 220, 320, 400 and up. This is a new method of finishing for us. We have had a portable tool before and

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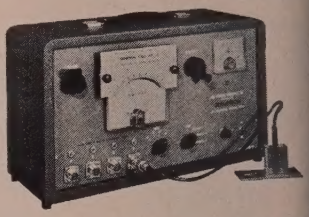

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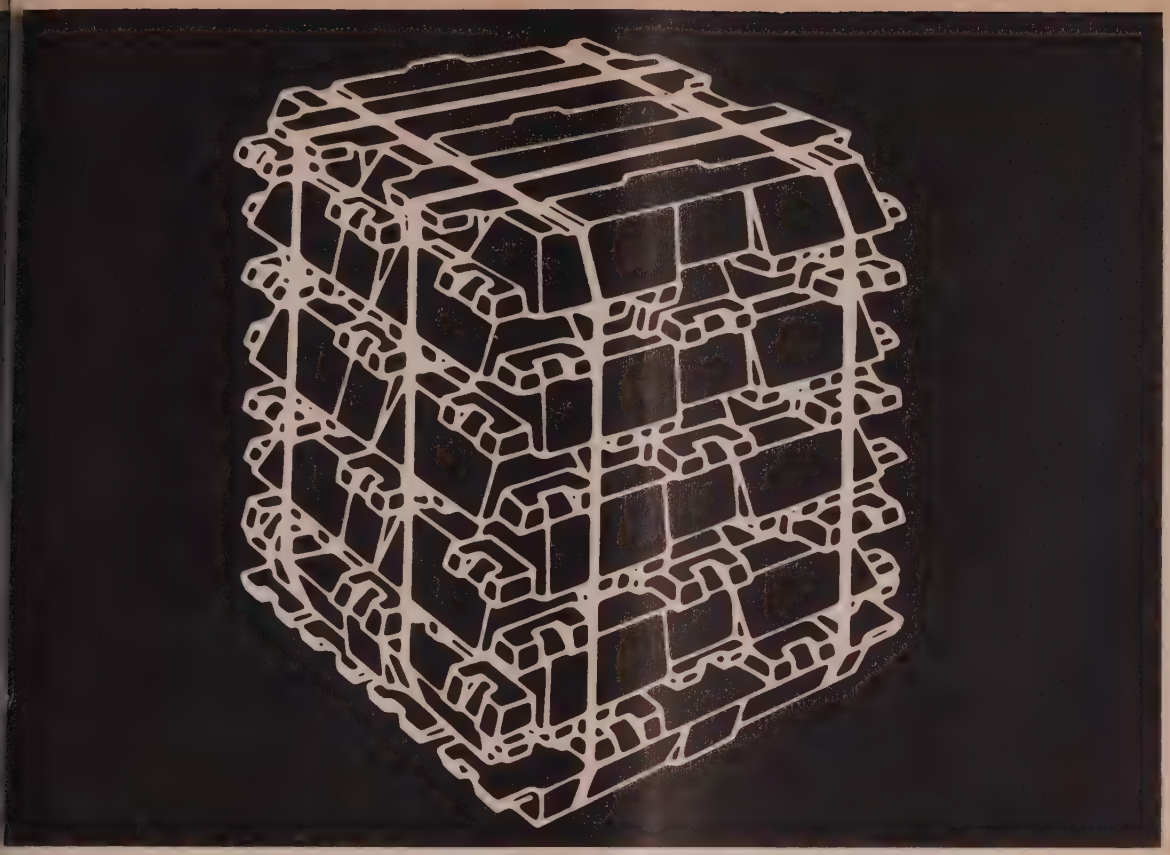

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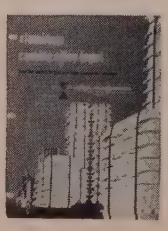

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have used fine grit in the closed coat on a cloth back.

On this portable machine the belt speed is given as 1102 feet per minute and we think this is slow because the belts load. We are having trouble with the belts picking up metal so the life of a belt is probably 10 minutes of actual use, as the metal it picks up holds the belt away from the material.

"C" — Minnesota

MM—Most manufacturers of abrasive belts can supply this type of information, but we'll attempt a few suggestions. Lubrication of the belt with oil, tallow, beeswax or proprietary compound will help minimize build-up of metal on the belt. (A simple but effective set-up for oiling the belt is illustrated in our reprint, "Cleaning and Finishing Aluminum.") Selection of contact wheel can be important. Since you are obviously performing fine polishing operations or buffing with such fine grit belts, try a smooth-faced rubber contact wheel, or one of the pressed canvas wheels. Sometimes you can get more mileage out of a belt that has become glazed by switching to a serrated rubber wheel.

Belt speed for polishing and buffing is generally in the upper ranges — say, 3500 to 6000 surface feet per minute. Don't try to use the same procedures and materials for aluminum and the cuprous alloys as you use on stainless steel. Contact pressure can be important, but it's best determined by trial and error.

Anybody else have any suggestions? We'll be glad to forward them to "C."

Bad Roll Forming Equipment

Sirs:

I read your article, "Roll Formers Rebuffed," in the November issue. I would like to see these cheap roll form machine manufacturers go into bankruptcy.

One of these siding machine exhibitors, and a former advertiser, sold me a machine that never produced a length of suitable siding. I personally lost $10,000 through his fraudulent claims.

Now if you investigated you will find that there is another advertiser who is selling machines that don't make good siding. . . .

"J" — Massachusetts

MM—It is no secret that some of the roll forming equipment sold during the past few years has been inferior and the claims made were a far cry from actual performance. In some cases, this resulted in very poor quality products. The net of it is, there is a lot of bad equipment some purchasers are trying to unload.

To our knowledge, there are half a dozen good roll forming machine manufacturers who have many satisfied customers. When buying this type of equipment, it's a simple matter to ask for names of satisfied customers. They, in turn, should be contacted before buying.

Military Buying on Increase

Sirs:

In the October issue (p. 14) under title of "Military Markets," you point out numerous new uses for aluminum — particularly sheet, plate and extrusions.

Then you wind up by saying, "Military hardware is becoming a huge — and regrettable — market for aluminum."

What you mean "regrettable?"

"V" — Illinois

Our point was that it's a shame military buying has once again become a big factor.

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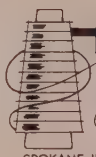

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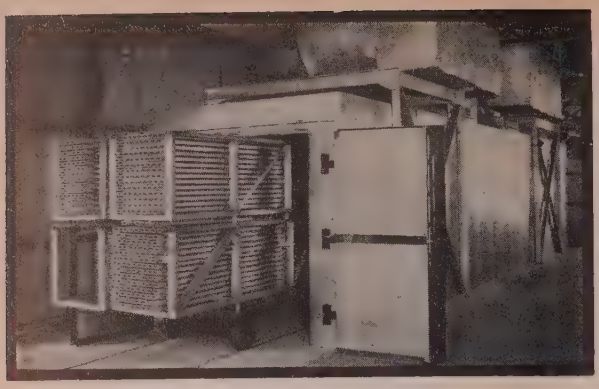

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Here and There

Sweet Smell of Success « « Chemical milling riding high, these days, if the performance of Chemi Contour Corp., Gardena, Calif., is any criterion. Co pany sales in the six months ended September 30 we $795,000 — more than twice the $338,000 recorded the same period last fiscal year. Net income after ta jumped to $88,000 as against $19,000 in the like peri of last year. Earnings per share were 22 cents vers 6 cents in the respective periods. These results in t first half of fiscal '62 do not include operations of t company's Empcor subsidiary which was acquired Chemical Contour last July. Several new programs a now under way at Empcor, including the applicati of a new corrosion preventive treatment for magne um. "The process provides outstanding corrosion res tance to machined magnesium castings, and is no being applied in substantial production quantity," co pany president J. H. Langworthy said. He also report that the company has a $600,000 contract from Boei for chem milling of aluminum wing structural comp nents for 100 units for the Boeing 727 commercial transport. Chemical Contour Corp. has launched expansion program that will double its present faciliti by early '62. This outfit is really moving.

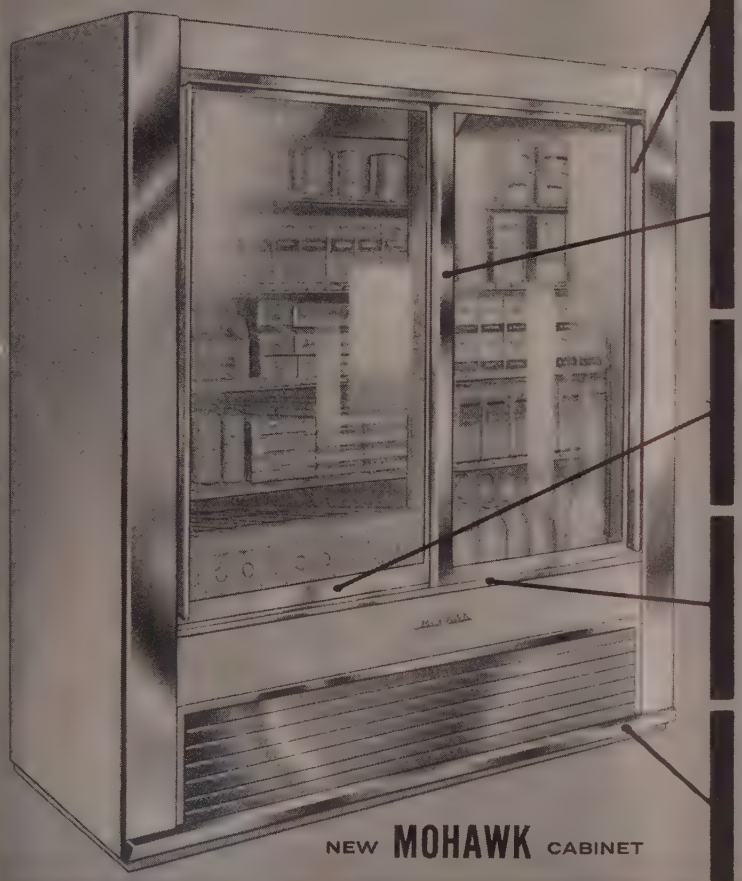
No Fire Sale Here! « « Sometime around mid-'6 some 12,500 tons of government-owned magnesium w go on the block in small lots. The metal has been s ting around outdoors for quite some time and will quire cleaning up. But reports are that surface con sion and scale are comparatively light. If efforts to g rid of the magnesium seem laggard it's because Un Sam is reluctant to do anything that will interfere wi the industry's labored growth. The stuff will be sold small lots. As required by law, the General Services A ministration must first publish its intent to sell metal, and then observe a six-month waiting peri from date of publication. The Dow Chemical Co. a Alabama Metallurgical Corp., the two commercial p mary producers in the U. S., have been alerted to plan and assured that the metal will be disposed of such a way as to minimize any disruption of magn um markets. In view of the good condition of this ventory, the government expects to get a good pr

Introducing Nitinol « « From the U. S. Naval C nance Laboratory comes word of new non-magn alloys destined to have important applications in workaday world. A combination of titanium and nic Nitinol is non-magnetic, corrosion resistant, and can hardened to 62 Rockwell "C," almost as hard as steel. It tests up to 43 foot-pounds impact strength, creases in toughness as temperatures decrease, ye suitable for use up to about 1200°F. With a spe gravity of 6.45, it offers strength without adding we to aircraft, tools, or other products. Nitinol, by re of its many favorable properties, could find wide in missiles, underwater ordnance (such as mine dis al), temperature sensing devices, chemical hand equipment, and space and aircraft components. In

(Continued on pa

DESIGNING A NEW PRODUCT?

ask Superior about its money-saving aluminum extrusions

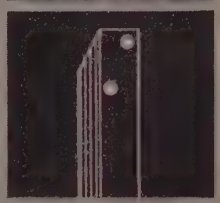


CABINET DOOR HANDLE

Extrusion includes rubber bumper adapter; mitered ends; drilled, countersunk, drilled and thread-tapped holes.

DOOR SLIDE RAIL

45° mitered, drilled, countersunk, polished, chemically brightened and anodized.

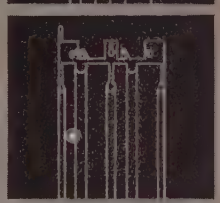


BOTTOM DOOR RAIL

(This section holds a nylon roller wheel.) Mitered, drilled, countersunk and precision thread tapped.

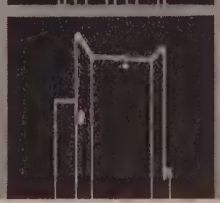
BOTTOM TRACK RAIL

Mitered, milled contours, drilled, countersunk, polished and anodized.



KICK RAIL

Notched, punched, polished, chemically brightened and anodized.



Let Superior show you how you can save money in many ways on your aluminum extrusions. The Mohawk cabinet above is an example of how this leading manufacturer gets extrusions perfectly fabricated from Superior Industries. The extrusions fit perfectly into Mohawk's production line without any further operation. Under one roof, Superior controls the fabricating and refinishing of all these parts, ready for assembly.

In addition to extruding intricate shapes, Superior miters, bends, rivets, drills, countersinks and notches the metal. Chemical and hand polishing, spray painting, anodizing and etching get professional attention. This entire performance saves you labor and factory time. And, thousands of companies have already taken advantage of Superior's complete services.

Send us samples, blueprints, or ask us to call. Superior engineers are now ready to help you to save in many ways.

ALUMINUM EXTRUDERS • ANODIZERS • ARTRIM MOULDINGS

SUPERIOR INDUSTRIES INC.

3787 Oakwood Ave.
Youngstown, Ohio

Melt aluminum by the cupful?

CASTING ALLOY DISTRIBUTORS

ALABAMA
ANNISTON 1
L. A. Draper Metals, Inc., 330 So. Noble Street. ADams 7-3585

CALIFORNIA
LOS ANGELES 23
McGowan Co., Inc., 1205 So. Boyle Street. ANgelus 3-7575

OAKLAND 20
Globe Metals Inc., 1820 Tenth Street. Highgate 4-7249

DELAWARE
WILMINGTON 99
North American Smelting Co., Marine Terminal. OLympia 4-9901

ILLINOIS
AURORA
Wm. F. Jobbins, Inc., P. O. Box 230. TWinoaks 7-8648

CHICAGO HEIGHTS
Benjamin Harris & Co., State and Eleventh Streets. SKyline 5-0573. INterocean 8-9750

MASSACHUSETTS
MIDDLEBORO 1
Bay State Aluminum Co., Inc., P. O. Box 89. Middleboro 1251-W

MICHIGAN
DETROIT 2
Milton A. Meier Co., 7430 Second Avenue. TRinity 5-9371

MINNESOTA
MINNEAPOLIS 7
Harry A. Brown Co., Inc., 2810—22nd Avenue, So. PArkway 2-6664

MISSOURI
KANSAS CITY 26
Altaw Distributing Co., 1601 Crystal Avenue. CHestnut 1-1337

NEW YORK
BROOKLYN 37
Henning Brothers & Smith, Inc., 91 Scott Avenue. HYacinth 7-3470, 1, 2

SYRACUSE 1
Syracuse Metal Distributors, Inc. (Thompson Road Plant), P. O. Box 83. HOward 3-8501

OHIO
CINCINNATI 9
Cincinnati Steel Products Co., 4540 Steel Place. TRinity 1-4444

Call!

Whether you use aluminum by the cupful or by the carload your nearby Olin Distributor offers you the finest service and fastest delivery as well as access to Olin's casting specialists. These are the men to talk to for information on the latest in improved casting techniques and help in creating the best alloys for your specific foundry purposes. Along with the industry's top brains, Olin Aluminum Distributors offer you the industry's top ingots — in 50-lb. sizes down to the exclusive 10-lb'er. Easily handled and specially adapted for close quantity control these fine-grain ingots are quickly available from mill supply and in less-than-truckload quantities. Whether you want aluminum thinking — or aluminum alloys — whether you're big or little — all you need to know is the local Olin sources above.

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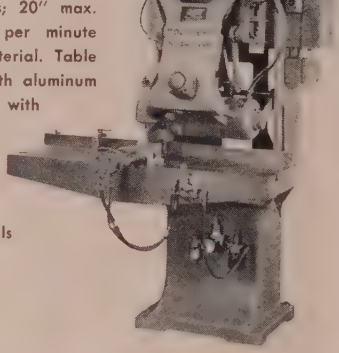
400 PARK AVE., NEW YORK 22, NEW YORK

"OLIVER" No. 94-DHM HYDRAULIC CUT-OFF SAW

Cuts nonferrous metals without burr and at a high rate of production

For aluminum extrusions, billets, copper and brass bars, tubing, etc. Designed for precision performance.

Saw: 14" std. for 3" cuts; 20" max. for 6" cuts. Stroke: 28 per minute maximum for 6" wide material. Table is cast iron 15" x 48" with aluminum throat plate and opening with chute for automatic removal of pieces up to 6" long.



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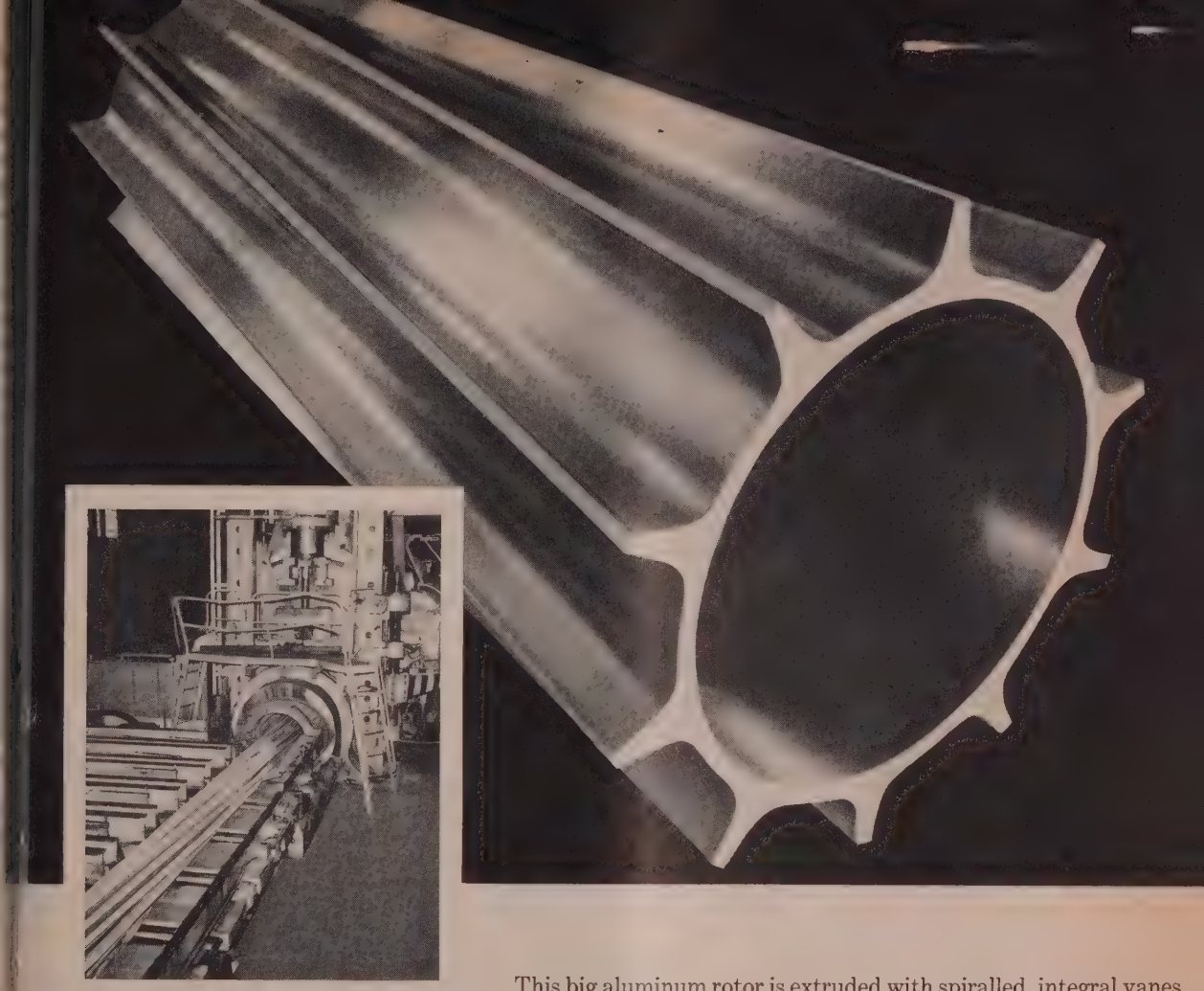
Chicago 11, Ill.

kitchen, the housewife will find that the lustrous fini that can be buffed or polished onto Nitinol cutlery w not stain or tarnish and the sharpness that can ground into its hardened cutting edge should rema almost indefinitely. There are potential uses in jewel auto trim, non-magnetic watch parts, and many othe As one might expect, the demands of advanced missil and spacecraft will in time deserve the credit if Nitin wins widespread use in the future. Weapons builde need low density materials with greater strength-t weight ratios and the capability of operating at ve high temperatures. Brittleness at room temperatu has been a limiting factor in the structural use of inte metallic compounds which otherwise are highly vers tile, with unusual mechanical and physical properti Early investigations at the Naval Ordnance Lab show that the compound TiNi possessed unusual ductility room temperature for a compound with a moderate high melting point. Further study uncovered the whe Nitinol series of new engineering alloys with their u usual mechanical and physical properties.

Hydro-T-Metal Making Headway « « Speaki of new alloys, Hydro-T-Metal made its trade show deb at the huge National Association of Home Builde meeting in Chicago earlier this month. In case you' forgotten, this material is a zinc-base alloy that contai copper, titanium, and other elements to give it har ness, rigidity and higher strength. Its proponents a sighting in on the building products industry as t nearest and best market. Hydro-T-Metal weathers we after a few months of exposure to the elements, it tak on a soft gray matt finish that makes painting unnec sary. Naturally it doesn't rust. Sales manager Albert Sikula said that the metal is a natural for gutters an downspouts, gravel stop and fascia, batten seam an standing seam roofs, valley, chimney and other types flashing, termite shield, and others. Hydro-T-Metal produced as strip in any thickness from .004 to .25-inc in widths from .25 to 54 inches (wider on special orde sheet and plate in thickness from .010 to .25-inch heavier on special order; in lengths from 72 to 1 inches; and in widths between 20 and 48 inches. Corr gated sheet is also produced in thicknesses of .020 an .032-inch, and in covering widths of 24 inches and inches. Corrugated sheet lengths are 6 to 12 feet. H drometals, Inc. executives at the NAHB Show we able to point to a 20,000-pound application of the met in McCormick Place (where the show was held) for pa apet and base flashing and other installations. The co pany has 13 distributors who operate 45 warehous employing some 700 salesmen. A jobber level is bei established. Production facilities are being establish in Japan and Europe, expanded here in the U. S.

Stop That Blood «/ « A serious danger to work in sheet mills and distributor warehouses is the slash wrist. Some employees don't like the uncomforta leather or canvas gauntlets they're supposed to w to shield their forearms against the sharp edges of me sheets, so many aluminum mills have adopted a s adhering gauze (made by General Bandages, Inc., M ton Grove, Ill.) that's easily applied and costs onl cents per worker per day.



NEW TWIST IN EXTRUDING ALUMINUM...

giant press produces 48-foot rotor with spiral vanes, eliminates welding

This big aluminum rotor is extruded with spiralled, integral vanes on a 13,200-ton press at Dow's Madison (Illinois) Plant. Substituting this extrusion for a weldment in Salina Manufacturing Company's "Blendvane" feeders not only cut production time and costs, but improved the unit's feeding action!

Using extruded rotors, Salina has eliminated the time and cost of welding on straight bar stock vanes. Spiral-vane design (not practical with welded vanes) produces a more even feed of the material being transferred.

IF YOU USE EXTRUSIONS, or weldments, it may be possible to extrude a better, lower-cost part than you are now using. Dow's experience and full range of extrusion equipment—including presses ranging from 1700 to 13,200 ton capacity—combine to produce parts in a variety of alloys and designs.

Conventional shapes, unusual shapes . . . see Dow for *both*. You'll find a combination of extrusion quality and economy that can make your profit picture brighter. For more information, write THE DOW METAL PRODUCTS COMPANY, Midland, Michigan, Merchandising Department 1115CQ12.

DOW ALUMINUM MILL PRODUCTS

THE DOW METAL PRODUCTS COMPANY
Division of The Dow Chemical Company

LIQUIDATION SALE

Brass and Aluminum Extrusion Plant

QUICK LIQUIDATION — ACT NOW!

2—1,800 Ton B-L-H Hi-speed brass or aluminum EXTRUSION PRESSES. Can be used for hollow extrusions. Each press equipped with Worthington 350 HP hyd. pump and motor. Pump new 1956, 6,000 P.S.I. 42 brass billets per hour.

ANNEALING OVEN for brass or aluminum extrusions. New 1955, 42 ft. long, 3 ft. x 5 ft. opening with cars.

QUENCHING FURNACE for brass or aluminum extrusions, 42 ft. long, 6 ft. wide x 4 ft. Water type quench. New 1955.

CONRAN PRESS TYPE CUT-OFF for brass or aluminum extrusions, 5" stroke - 6" wide knife with holddown.

2—TRIPLEX ALDRICH HYD. PUMPS, 5,000 P.S.I., 300 HP, Size 3/16 x 16.

#4 Kane & Roach Single Plane SHAPE STRAIGHTENER, Dia. of Shaft 3". Max. dia. of rolls 14".

1-B Kane & Roach Single Plane SHAPE STRAIGHTENER, Dia. of Shaft 2" - 3 over 4 Adjustable centers, New 1955.

TABLE SAW for cutting aluminum or brass extrusions 12" dia. blade, 20 x 36 Table.

AJAX Brass or Aluminum Melting Furnaces, Electric, New 1954.

DRAWBENCH, 33,000# AETNA, 50 HP, New 1952, 42 ft. draw.

FALVER STRETCH & TWIST STRAIGHTENER, 20 HP Hyd.

MESTA 4 High Rolling Mill 20" work rolls x 42" back up rolls.

Write — Sta. A, Box 154, Toledo 5, O. — Phone 693-0429

too small to advertise ?

Not at all. Many small firms are getting new business with ads of *this* size. It will cost you only $120 per month (on annual basis) and we will make up a *selling* ad for you. For details, write to Chris Oberheide at Modern Metals, 435 N. Michigan Ave., Chicago 11.

Useful Dat

Data on aluminum and its alloys, including m ical, physical and other properties, standard tole and other useful information on standard alum alloys and the mill products normally produc these alloys are being distributed in a fourth re of "Standards for Wrought Aluminum Mill Pro by The Aluminum Association. New material i 1961 edition includes standards for duct shee silver-plated bus bar and a new section on sam and testing. Recipients of previous editions will r this 107-page volume automatically. Otherwise, copy will be sent on request on your company head to the Association at 420 Lexington Ave., York 17.

Roll forming machines are detailed in a new brochure prepared by Dahlstrom Machine Works 4227 W. Belmont Ave., Chicago 41. Included are fications and construction details of six models of gear and bevel gear Series "00" (outboard type five models of spur gear series "50" (open front o board type). Rudy Toczyl will send this brochure quest.

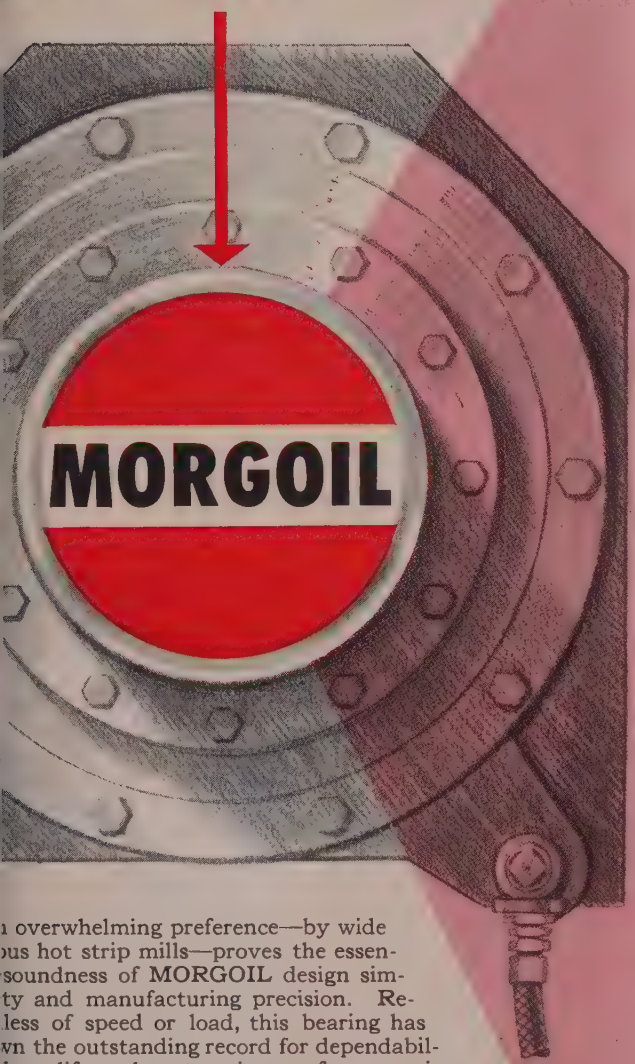
Porcelain enamel on aluminum fact brochur new information piece brought out by Vikon Corp., 130 N. Taylor St., Washington, N. J. In company describes its facilities, services and a plishments in the field. A member of The Por Enamel Institute, Vikon details such steps in c porcelain enameling as metal treatment, enamel enamel spraying, screen printing and fabricati representative of its production facilities. Write J. Jensen for a copy of this brochure.

Strippable vinyl coatings that protect metal su during processing or storage are the subject of pictorial folder demonstrating the ease with Delchem vinyl coatings are sprayed on surface how easily they strip off. The piece also explai of such coatings in operations like alkaline cle (up to 75°F), processing and rinsing, light stam forming and drawing. Write to Dawes Walter at salt Chemicals Corp., Three Penn Center, Ph phia 2.

Die casters' alloy specification data are given series of reference charts and folders distributed form by Doehler-Jarvis Div'n of National Lead Smead Ave., Toledo 1, Ohio. Listed are all c alloys (zinc, aluminum and magnesium) covered company's Alloy Data Sheets. These alloys are referenced according to applicable designation specifications, so that they may be readily iden Write to Edward Olsen at 111 Broadway, New

Latest data on the properties of aluminum a alloys, wrought and cast, is presented in Reynolds als Co.'s 1961 edition of "The Aluminum Data B The 8½ x 11-inch, 194 page handbook contai

3 MORE HOT STRIP ILLS SINCE 1955 AVE GONE TO



- ALGOMA STEEL
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n overwhelming preference—by wide
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tables of data covering the entire field, offering a valuable guide to the engineer and designer working with aluminum. It is available by letterhead request to Reynolds at Dept. PRD-62, Richmond 18, Va.

Insulated firebrick made by Kaiser Refractories Div'n of Kaiser Aluminum & Chemical Corp. is described in a new brochure. Characteristics and properties of six types of insulating brick, especially designed to cover exposed service temperatures ranging from 1600° F to 2900° F, are given; also information on recommended placement of the various types of insulated fire brick, heat loss, temperature gradients, and heat storage capacities of these products, as well as other important information. Write to the Division at 300 Lakeside Drive, Oakland 12, Calif., for "Kaiser Insulating Refractories." In Canada address Refractories Engineering and Supplies Ltd., 8291 Royden Rd., Montreal, Quebec.

A lubricant oil additive for most metalworking operations is the subject of a new brochure published by Bemol Inc., 131 State St., Boston 9, Mass. Bemol No. 140 suspension is described as "an anti-wear additive to metalworking and maintenance oils." Wear tests discussed in the brochure purport to show the superiority of the No. 140 over graphited and other types of anti-wear additives. Write to Peter Magie for this.

Abrasive belt grinders, and their wide application in polishing, buffing, and deburring operations such as internal, flexible belt, platen, contour, and contact wheel, are the subjects of a new catalog just printed by Hammond Machinery Builders, 1609 Dougla Kalamazoo, Michigan. In addition to providing prehensive data on the use of Hammond Abrasiv Grinders, the new 20-page catalog contains sp tions, photographs, and cutaway drawings illus the construction and design features of each g Write to W. C. Johnson, Hammond Machinery ers, Inc., for this catalog.

Core joining compounds for use with natura synthetic resin, and CO_2 process sand, and with steel, copper base, aluminum and magnesium, a scribed in a two-page, two-color leaflet M-4, by Inc., P. O. Box 8728, Cleveland 35, Ohio, deve of the compound. A convenient chart for self- and heat-setting types describes the numerou categories in terms of grade, form, setting application, and uses. Brief, informative instru tell how to use each type. In addition, the leafle hints on the use of Foseco Corfix compounds for j large flat configurations, patching core surfaces ing cracks between cores, joining shells in shell ing and coating cores. Write to Harry Meinzer

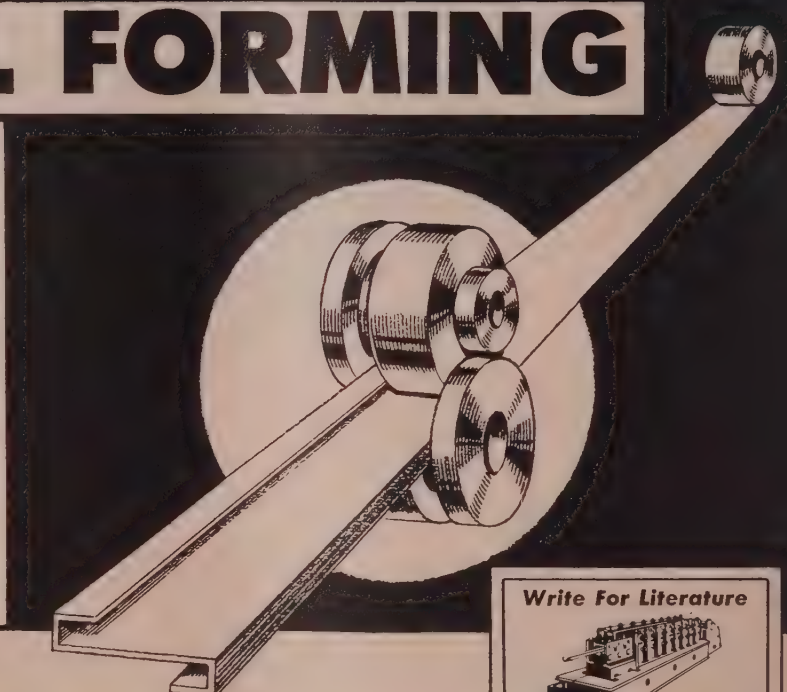
Ultrasonic grinding by the Cavitron proce cylindrical, centerless and surface grinders scribed in a brochure of Cavitron Ultrasonics 5102 21st St., Long Island City, N. Y. In word pictures it explains how high frequency sound act to keep grinding wheels cool and clean an duce superior ground surfaces. Stanley Babso send this brochure on request.

ROLL FORMING

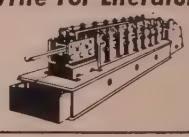
by

Dahlstrom

Dahlstrom Roll Forming Machines are recognized in industry for their modern features that cut costs . . . designed for efficiency with rugged construction for greater economy of operation . . . **more for your investment dollar.**



Write For Literature



Dahlstrom MACHINE WORKS • INC.

4231 W. Belmont Avenue • Chicago 41, Illinois • SPring 7-3670

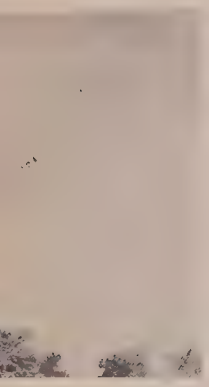
SCANNED 30 of 101
modern-metals_1962-01_17_12

hen a 100-ft aluminum ladder stands a 20,000-ft-lb twist . . .

(Photo courtesy Bureau of Fire, Rochester, N. Y.)

When a 100-ft aluminum ladder stands a 20,000-ft-lb twist . . .

that's Alcoa Total Ability at work!



With a 200-lb fire fighter perched at its tip, a 100-ft aerial ladder must stand up to torsional strains as high as 20,000 foot-pounds. Builder Peter Pirsch & Sons Co., Kenosha, Wis., gets the tensile strength of steel—*at one-third the weight*—from Alcoa® Aluminum Extrusions.

Less dead weight means quicker operation and greater safety for the ladder's live load. Its hydraulics cost less, too; pressure is lower, safer. Alcoa Aluminum will never rust, so needs no paint that might blister or peel.

By using metal most efficiently, Alcoa Aluminum Extrusions withstand exceptional stresses for their weight and section. Besides, they can save on machining, joining and assembly. Dies cost little, and Alcoa already has many for standard an bars, channels and shapes from H to Z.

Alcoa has turned out more than 150,000 di ent extruded shapes. We operate two of the wo largest extrusion presses: 14,000 tons. Five pl coast to coast, make Alcoa the world's la source of extruded shapes.

We're not only extrusion experts. Alcoa makes castings, forgings, impacts and screw chine parts. So our only concern is doing you best at least possible cost. That's how *Alcoa Ability* works, from the design on. How ca help you? Find out by calling your nearby A sales office; or write: Aluminum Compan America, 860-M M Alcoa Building, Pittsburgh 1

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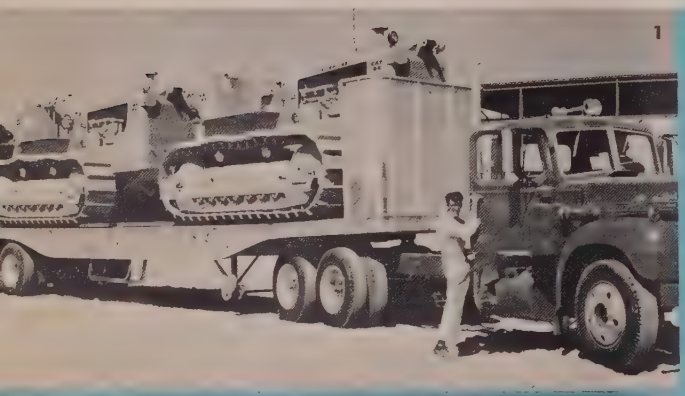

New Enterprise

olaircraft, Inc., Aliquippa-Hopewell (Pa.) Airport, oduced its first **plane** last month. It's a high-wing, -passenger single engine craft embodying many in- sting structural features, according to Alcoa, sup- r of the aluminum. "We conceived the Volaire as h a personal plane and business utility plane, ced to meet a definite need in these fields," said k Gilberti, Volaircraft president.

pace simulation equipment (in which conditions outer space are reproduced) makes effective use of be-In-Strip, Revere Copper & Brass, Inc.'s one-piece ed sheet product. Tenney Engineering Inc., 1090 ingfield Road, Union, N. J. is the manufacturer. the simulator, the test item will be completely sur- nded by plates of the tubed sheet, according to bert H. Brown, Tenney's vice president. The plates st absorb the heat load of the test vehicle as well solar radiation simulated within the chamber. Also, plates must withstand circulation of liquid nitro- n for simulation of the 320° F. temperature of outer ace.

Improved Model 568 portable electric **saw** has a die st magnesium housing, helping to hold its weight to ½ pounds. It's made by Porter-Cable Machine Co., 24 Marcellus St., Syracuse 1, N. Y.

Everybody knows that worn stairs are safety hazards. s an important mission of Wooster Products Inc., ruce St., Wooster, Ohio, to correct this kind of haz- d with aluminum Stairmaster safety **treads.** Safety- bs of diamond-hard abrasive grit provide positive ti-slip protection even under wet or oily conditions. plastic mix is used to fair up the worn surface be- re screwing the tread onto the stair.

Preformed aluminum flange gate **valve covers,** com- lete with insulating materials, are being offered by remetco Inc. Shreveport, La. The covers, formed from 003-H14 alloy, are ready to install with polyurethane, alcium silicate, foamglass or cork insulation.

The all-aluminum **home** will soon have another ex- onent. A new manufacturing firm has been organized y Jacob Busch, former owner of Busch Metal Prod- cts, J. R. Lischka, secretary-treasurer of Lischka Mfg. o., both of St. Petersburg, Fla., and M. B. Smith, vice resident of the International Bank of Tampa. The ew firm, National Panel Corp. will be headquartered t 10383 Oak St. in St. Pete, and will concentrate ts initial marketing effort in Florida. A 10,000-square- oot plant is under construction for an initial produc- ion of ten homes per week.

Reynolds International, Inc., wholly owned subsidiary of Reynolds Metals Co., has acquired Aluminum Ex- truders, Ltd., a Canadian firm, for an undisclosed

IT'S EASY TO FASTEN ALUMINUM if you know:

- type of fastener to use
- proper alloy & heat treatment
- when & how to use solid rivets
- how to design for riveted joints
- when tubular rivets are OK
- best tools for driving rivets
- when to use automatic riveters
- advantages of metal stitching
- its limitations, too
- machines & design for stitching
- types of standard aluminum threaded fasteners available
- how to determine tensile & shear strength of fasteners
- how to determine torque for aluminum fasteners
- how to make fastener holes in aluminum
- how to tap holes in aluminum
- types of powered screwdrivers
- how to specify & use special rivets, screws, bolts, locknuts, washers, studs, inserts, others

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For
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- Coating on Aluminum Dip Ladles
- Core Box and Pattern Parting Agent
- Monorail Tracks and Frogs
- Sand Conveyor System Parts
- Base Block Release Coating
- Lift Truck Guides
- Pattern Shop Equipment
- Chill Coating

An easily-applied liquid, dries quickly to form a hard, smooth lubricating graphite film on any surface where sliding friction is a problem. Withstands above-normal temperatures. Doesn't pick up dirt, sand or abrasive dust.

Instant drying #220 packaged in 16 oz. aerosol cans. Graphokote #95 paint consistency in qts., gals., 5 gals. and 55-gal. drums.

DIXON GRAPHOKOTE No. 74 Lubricating Graphite in Water

For
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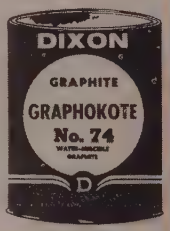
- Die Casting Release Coating
- Extrusion Die Coating
- Spot-Weld Coating
- Slush Mold Coating
- Forging Release Agent
- Core Release Coating
- Chill Coating



High quality graphite suitable for dilution in water. For brush, spray and dip applications. In qts., gals., 5-gal. and 55-gal. drums.

DIXON GRAPHOKOTE No. 1 Natural Colloidal Graphite in

For
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A *new* colloidal suspension of h purity *natural* graphite in oil, proved for use in automatic lubric ing spray systems. Contains 10% weight lubricating graphite and m be diluted with oil, kerosene o other hydro-carbons. Does not set In 1-lb. and 8-lb. cans and 40 buckets.

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- Lower Costs
- Improved Operation

Reduces wear, prevents seizing, c galling, lowers friction when used plungers of cold chamber die cast machines. In 25, 50 and 100-lb. dru

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- Die-Casting Dies
- Shell Molding Machine Parts
- Forging Dies
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- D/C Molds
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- High Temperature Appliances

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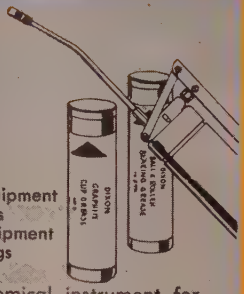

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- Machine Tools
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A clean, economical instrument for handling greasing problems. Develops 8000 lbs. pressure, suitable for Zerk & Alemite fittings. Eliminates the waste and grease contamination of hand-filled guns.

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amount of cash. The firm had been a wholly-owned subsidiary of the Kruger Organization, Ltd., Montreal.

A new, economical method for making **cut-outs** in thin wall aluminum tubing, 1½ inches diameter and up, as well as other materials, has been developed by the T. G. Persson Mfg. Co. "In most operations, this method increases production by 1000% over standard milling and slitting procedures now used," said T. G. Persson. "It practically eliminates deburring." The company is at 2 Henry St., Bloomfield, N. J.

Annular aluminum **rings** having cast-in tubular heaters form details of a large vacuum pump made by Consolidated Vacuum Corp., 1775 Mt. Read Blvd., Rochester, N. Y.

An aluminum **case** is used to house a portable voltmeter made by Instrument Laboratories, 315 W. Walton Place, Chicago 10. Range is 0.0003 to 300 volts. Accuracy is said to be 5% of full scale, 100 cps. to 500 kc. The aluminum case measures 3 x 4 x 6½ inches high. Weight of unit is two pounds.

Searjeant Metal Products Inc., Box 44, Mendon, N. Y., makes a new line of safety **pliers,** vacuum lifters and other hand tools for feeding punch presses and similar machines. Made of aluminum alloy, the tool will crush without damaging a die should it fall onto bed. Searjeant makes vacuum lifters with lifting capacities up to 10 pounds.

Milk bottle **closures,** heretofore maintained in dairy plants in large quantities, can now be made as needed using printed foil-paper laminated stock and the Fords machine, offered in this country by Reinhold Auerbach, Inc., 44 No. 2nd St., Easton, Pa.

Norway's magnesium industry continues to grow. In 1960, production increased 7% over the preceding year, accompanied by a rise in magnesium exports. Norsk-Hydro Elektrisk Kvaelstof A.S. produced more than 11,000 short tons last year, using dolomite and sea water. Norway is said to be shooting for production capacity of 30,000 tons a year.

Precision Castings Co., second largest custom maker of aluminum and zinc **die castings,** will expand its facilities at Fayetteville, N. Y. Jay Levine, chairman of Fulton Industries, Atlanta, Ga., Precision Castings' parent company, said that more than $250,000 is earmarked for new equipment and expanded production facilities, including the enlargement of the present Fayetteville building, and will create about 150 new jobs. Precision Castings has another plant in Cleveland.

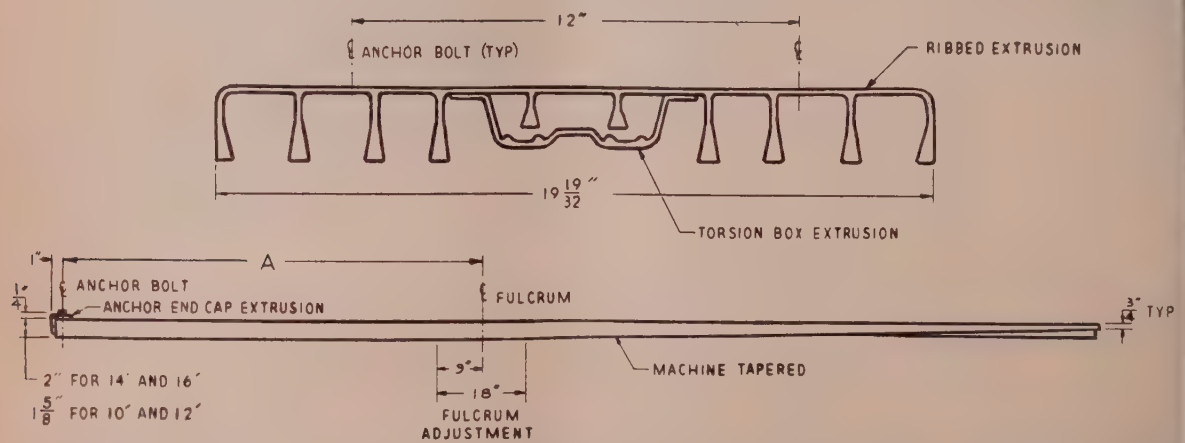
Eleven acres north of Jonesboro, Ga., near Atlanta, will be the site of a new manufacturing **plant** of Kawneer Co. Lawrence J. Plym, president, said aluminum walls, windows, entrances and sliding doors will be produced at the 81,000 square foot manufacturing warehouse and office building. An important design element will be Kawneer's own Zipperwall curtain wall system.

■ *Joseph H. Woodard holds extruded aluminum scroll which won for him top honors as "the most ingenious extrusion" in the Aluminum Association's first Extrusion Design Awards competition. Various bending operations produce different scrolls from a basic shape, and are used as decorative element in metal furniture.*

■ *Grant V. Mack (center) and Harry J. Loehlein (right), both of Reynolds Metals Co., pose beside an extruded and pierced refrigerator or freezer shelf which won for them first prize in Category 2 of the Aluminum Association's extrusion design contest. R. L. Spence (left) represented G. R. Shockley of Reynolds, who nominated the two engineers.*

DESIGN CONTEST REVEAL UNIQUE USES, WIDER FIEL for EXTRUSION

by H. K. Darby
Associate Editor



■ *Another honorable mention went to Ray Rude, president of Arcadia Air Products, Pasadena, Calif., for an extruded aluminum diving board, drawing of which is shown here. Three extrusions were produced by Harvey Aluminum, Torrance Calif. Arcadia Air Products applied a unique finish to the boa to give it a pleasing, durable color and a non-slip surfa*

UNIQUE decorative scroll for furniture and an ingenious shelf m for refrigerators and freezers top honors in an extrusion gn contest sponsored by the Alu- um Association. Results of the petition, the first of its type sored by the Association, were ounced late in October.

ther designs that received honor- mentions included a tiny hol- shape for a secret military appli- on, a heavy-end pipe for the oleum industry, a diving board le up of three extruded shapes, an extruded panel for folding rs.

t is hoped that publicizing of the test and the winning designs will us the metalworking industry's ention on the versatility of the rusion process. This increased in- est, in turn, should culminate in v applications for aluminum ex- sions.

The need for new uses is well

redit The Aluminum Association for having a smart omotional idea that could benefit the industry even ore were it to be extended to other aluminum fields. he Extrusion Design Awards, despite a faltering ebut, focuses attention on a growing range of nd product applications. Stricter contest rules i '62 could supply competition pattern for forgings, astings, sheet and other wrought aluminum products. Modest cash prizes would doubtless stimulate broad interest, particularly among designers.

nown. Although shipments of luminum extrusions have nearly ripled from 127,615 tons in 1950 to 70,355 tons last year, the actual con- umption of extruded shapes is eavily concentrated in a relatively arrow range of products. Windows, loors and curtain walls are the main nes.

This lopsided reliance on a hand- ul of consuming industries has ended to stymie further growth of he extrusion industry and aggra- ate the price weakness that has plagued the industry in recent years. If new tonnage markets could be cultivated, the industry's over-capac- ity problems might be solved. It was against this background that the Alumimun Association initiated its Aluminum Extrusion Design Awards.

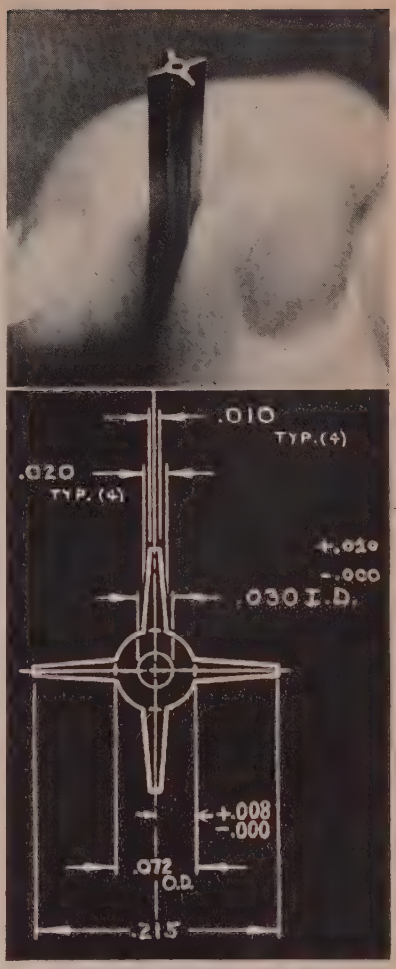
"The Awards were created to generate greater awareness of the versatility in design and service of- fered by aluminum extrusions," said Donald M. White, executive secre- tary of the Association. "The com- petition is intended to draw attention to outstanding extrusions produced, and to pay special honor to those responsible for the conception and production of those extrusions."

Any aluminum extruder whose principle place of business is in the U.S. could nominate individuals either from their own plants or from their customers in the U.S. and enter extrusions in the competition.

The contest committee set up two categories of awards. The first, for the most ingenious extrusion, evalu- ated entries in terms of originality, difficulties involved, and the degree of accomplishment gained by the de- sign. The second category was for the most noteworthy extrusion con- verted into a finished part. The same criteria applied to this category, but additional considerations included market potential and esthetic value.

The winner in Category 1 was the decorative scroll shape (see front cover) designed by Joseph H. Wood- ard. This unusual shape was created for the new Andalusian group of wrought metal furniture produced by Lee L. Woodard Sons, Owasso, Mich. The extrusion is produced in a continuous length, then sliced into quarter-inch thick "wafers" for fur- ther fabrication into decorative de- tails for chairs, tables, and other pieces.

"It was designed as a solid, for economy, in such a way as to permit certain inexpensive re-forming oper-



Close-up photo and drawing of what is claimed to be the smallest hollow extrusion ever produced. The extrusion ratio was 1760 to 1; the shape weighs one pound per 100 feet. It won an honorable mention for G. H. Bauer of Mideast Aluminum Corp., Dayton, N. J. The largest hollow extrusion, also for a secret military application, is pictured and described on the next page.

ations," Woodard explained. "It gives us maximum design flexibility. The wafers are joined together into various patterns by steel clips which are then welded to the chair or table framing members."

Aluminum Extrusions, Inc., Char- lotte, Mich., shared honors with de- signer Woodard for having produced the die and the extrusions.

The refrigerator-freezer shelf that took first place in Category 2 was credited to two engineers at the Grand Rapids, Mich. extrusion plant of Reynolds Metals Co. — Grant Mack, regional engineer, and Harry J. Loehlein, project director.

This extrusion consists of mul- tiple, adjoining T shapes which pro- vide structural rigidity along the

extrusion axis, Reynolds explained.

"It is perforated and expanded to an open pattern of pleasing and different design," explained the Reynolds statement. "The expansion increases the effective width of the extrusion, thereby reducing extrusion circle size and minimizing metal thickness requirements."

It was explained that the load carrying capacity of the extruded shelf can be modified by changing the expansion ratio of the dimensions of the individual T shapes.

Refrigerator shelf slide-out features can be incorporated as integral parts of the base extrusion. The shelf is completed by attaching front trim and rear extrusions. The single shelf extrusion replaces 40 to 50 wires used in conventional shelves,

Functional, Decorative Too

Such a shelf for food freezers would comprise an extrusion cut to length, lanced or blanked, and stretched into a decorative pattern. Heat exchange tubing could be snapped or pressed into integral tube retainers on the under side (see illustrations).

Two honorable mentions were awarded in each category. In Category 1, G. H. Bauer, plant manager of Mideast Aluminum Corp., Dayton, N. J., was cited for design of "the smallest hollow extrusion in existence." End use is as "part of a guidance mechanism for a classified military item." The bore of this component is 0.03-inch inside diameter. Total distance from tip to tip of opposing flanges (see drawing) is less than one-quarter inch. The Detroit plant of Moczik Tool & Die Works made the die for this interesting shape.

The other honorable mention in this category was won by D. J. Cullen and J. A. Merrill, Reynolds Metals Co., Phoenix, Ariz., who designed the company's "heavy end pipe." The pipe, having uniform inside diameter, but greater wall thickness at the ends, is used in oil well drilling. One rig has successfully completed 100,000 feet of drilling. The designers report that this pipe is producible in both hard and soft alloys in diameters from 2 to 12 inches.

Category 2 honorable mentions were won by Ray Rude, president of Arcadia Air Products Co., Pasadena, Calif., for his design of an aluminum diving board called the Duraflex. Three extrusions make up the diving board, which is produced in 10-, 12-, 14- and 16 -foot lengths.

Riveted to the underside of the basic ribbed extrusion is a torsion box shape which, in the 16-foot length, calls for 264 rivets (¼" x ⅝"). An anchor end cap extrusion is riveted to the basic shape using two ¼" x ⅞" rivets and a dozen 3/16" x ¾" rivets. All three extrusions are heat treated to a minimum tensile strength of 50,000 psi.

According to Harvey Aluminum, who produced the extrusions and made the nomination, the board is given a unique finish. First it is acid-etched, followed by an Iridite (Allied Research Products, Inc., Baltimore) conversion coating.

The board is then completely coated with an aqua colored thermo-setting epoxy resin. The top surface of the board is then given a second coat. Next, a mixture of white aluminum oxide and fine grain sand is spread on the top surface, after which a third coat of the same epo resin is applied.

The finish is then cured in electric oven. Harvey made all t dies for this unique springboard.

Ernst J. de Ridder, director engineering development, Reynol Metals Co., was awarded the oth honorable mention in Category 2 f his design of an extrusion for folding door. In this assembly, extruded panel is used as the ma member of each door section. T clamp-like part of the panel at ea end engages leather or plastic stri which allow folding and continui of the panels.

Pleasing color combinations c be achieved by color anodizi panels and choosing contrasting c ors for the plastic strips.

Judges for the Aluminum Extr sion Design Awards were Bronisla Zapolski, industrial designer; Her R. Clauser, editor of *Materials Design Engineering;* and W. Griffin, publisher of *Modern Meta*

Some of the more interesting e tries in the competition follow.

Largest Extruded Aluminum Hollow Sectio

What makes this extrusion an oddity is the fact that it comes from the electronics industry where components are usually small. This time, however, they designed what Harvey Aluminum believes is the largest multiple hollow shape ever extruded. It is produced on Harvey's 12,000-ton press.

Measuring 24.190 by 2.485 inch the extrusion is fabricated into modular cabinet assembly comp nent for an electronic control s tem. Made in alloy 6061, the si hole shape functions as both containing unit and a supportin member. Outside wall and w thicknesses are .250-inch; end wa

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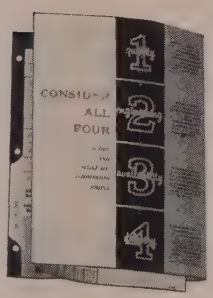

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thickness is .312-inch, Harvey said.

Initially, the configuration was planned as a built-up aluminum section using sheet, plate and small extrusions, Harvey said. Re-designed as a one-piece multiple hollow, the extruded shape cuts manufacturing costs, eliminates detailed assembly, reduces weight, and increases structural reliability.

"Imaginative designers are beginning to show great interest in wide multi-cell panels," Harvey reported. "Fabricated in one unit, these versatile extrusions increase manufacturing capabilities and greatly improve design efficiency by acting as structural sections and as passages or storage areas for controls, gases, liquids, fuels, components, etc. Furthermore, panels can be readily designed to interlock."

Current applications for large multiple hollow extrusions include airfoil sections, missile bodies, missile launching, and decking.

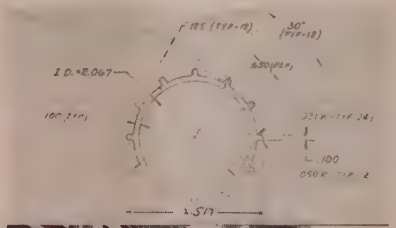
Magic Chef Spruced Up By Extruded Panel

Light Metals Corp., Grand Rapids, produced this control panel for Magic Chef, Inc., Cleveland, Tenn. The extruder delivered the part to Magic Chef ready to install, having performed all operations.

Production sequence began with a 70-foot extrusion which was sawed to uniform lengths of 20-7/16 inches, ± .010-inch. Two piercing operations produced 198 slots after which six slots and four round holes were pierced. The ends were then formed to a radius and excess metal from the end forming was sawed flush with the back surface. The part was then etched, chemically brightened (R-5), and given a 10-minute anodize. Overall length of completed part was 19 inches, ± .015-inch.

T. A. Mero of Light Metals Corp. pointed out that, following this successful production of Magic Chef's design in 1957 new uses for this type of fabricated extrusion were developed.

"This basic idea is used by Amana and Gibson for the extruded grilles at bases of their refrigerators," Mero said. "Tappan, Caloric, Welbilt, Roper, and others employ it for extruded vented backguards. The vending industry has also adapted the idea."



New Street Sign Posts for Philadelphia

New extruded aluminum poles for all street and traffic signs are being produced for the City of Philadelphia by New Jersey Aluminum Extrusions, New Brunswick, N. J. According to David M. Smallwood, Streets Commissioner of Philadelphia, the city will eventually have some 300,000 of the maintenance-free poles.

The extrusions for the sign poles are produced in two sizes, one having an overall outside diameter 2.517 inches; the other, 3.518 inch Twelve vertical ribs, spaced eve around the circumference, prev the pole from being turned in foundation and prevent the si from being reversed by prankste

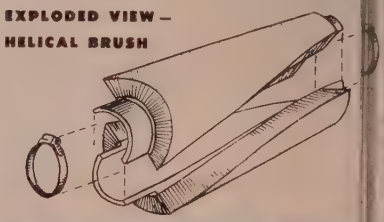
The new poles were developed Milton Moritz, superintendent the signal and sign shop of Traffic Engineering Div'n, and New Jersey Aluminum Extrusio Moczik Tool and Die Works, troit, made the dies.

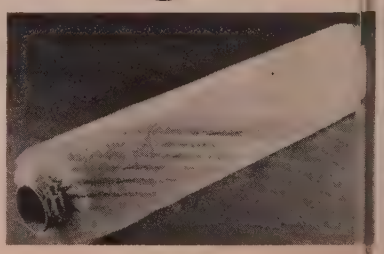
Extrusion Saves Money for Power Brush Users

Cylindrical brushes have ma uses in industry—in satinizing hi pressure laminates, glass washi scrubbing steel, textile blank scrubbing, to name a few.

For many years the replacem cost of worn-out brushes has be excessive, due to the down-time curred in remvoing the brush sh from the equipment, and the ad tional time required to replace worn-out brush strips in brush ho ers.

Power Brushes Inc., Toledo, Oh has reduced this high replacem cost by introducing a throw-a brush core, utilizing aluminum trusions produced by Bohn Alu num & Brass Corp., Detroit. T brush core is extruded in two hal which have slots to hold the br strips in place. The brush halves fixed firmly on the shaft by a ra tor hose-type clamp attached to e end. The worn-out brush core be readily removed from a machi





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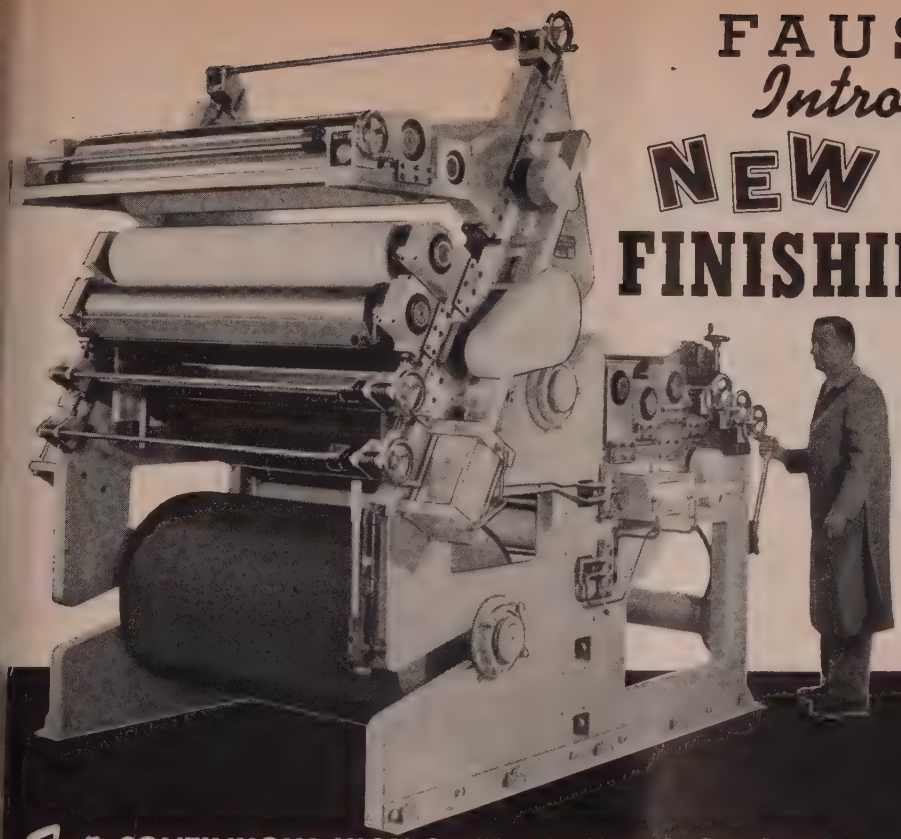

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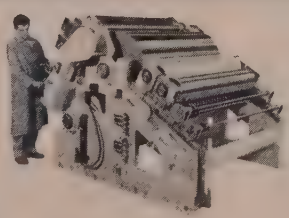
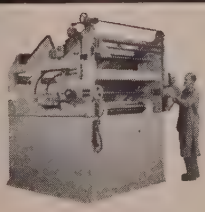
Engineered from the ground up for ruggedness and performance, this coating line includes adjustable wear take-ups that provide extra years of trouble-free performance. Each roller in both prime and finish coaters operates through its individual variable speed synchronous motor drive with separate frequency regulator. Perfect pattern register is assured through electronically activated ball-type slide bushings which shift the entire printer.

TWO OR THREE ROLL COATERS handle both direct or reverse roller coatings for either top or bottom side application. Three roll coater includes individually-driven metering roll for Plastisols or other materials not having sufficient flow characteristics.



PRINTING STATION can include the unexcelled offset rotogravure process for perfect tone work. Multiple flexographic printing heads are also available.



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WORLD WIDE REPRESENTATIVES

Uniform Mold Wash Simplifies Close Tolerance Casting

A FRONT header for a convertible car is one of the more demanding foundry jobs because of the care which must be taken with certain thin sections in its length as well as the close tolerances called for by the auto manufacturer.

A front header fits above the windshield frame where the convertible top fastens. The main body of the casting is 61 inches long and has 12-inch projections on either end. It is cast of aluminum alloy 355 by the permanent mold process. When trimmed, the casting weighs 18 pounds. They've been a pretty steady diet at Enterprise Brass Works, Muskegon, Mich.

Thin sections in the header mold require a wash that provides extra insulation. Heat loss in these areas used to cause premature solidification of the metal resulting in unfilled cavities in the mold.

Another job performed by the wash is as an effective parting agent. The auto manufacturer's close tolerance specifications could not be met if much pressure was needed to remove the part from the mold.

The mold washes that Enterprise Brass mixed in the foundry had met these requirements, but uniformity from batch to batch could not be counted on. This placed an extra burden on the machine operator: He had to cope with varying reactions of the washes to heat, pressure and friction.

Formulated of fire clay and red talc with a bond of sodium silicate, the mold wash consistency was subject to variations in raw materials and to variations in proportions that are almost impossible to exclude when formulations are mixed "by hand."

For the past year, however, Enterprise has been using a proprietary mold wash, a dispersion of vermiculite in water. Manufactured under carefully controlled conditions, the dispersion enables Enterprise to get uniform wash consistency from batch to batch.

A product of Acheson Colloids Co., Port Huron, Mich., and called 'dag' 193, it is mixed with water in proper proportions and sprayed on the die after the die has been preheated to 450°F.

According to William Johnson, permanent mold superintendent at Enterprise, the coating thickness is relatively non-critical for large castings and will approximate 0.00 inch for the front header.

Under normal operating conditions, an application will remain effective on the mold for casting up to 300 units, during 40 hours of continual operations. The compound is applied to all cavities of the header die except the gatings, where higher insulation requirements necessitate use of a whiting compound.

To Pour Properly . . .

The pour is made when the ladle temperature of the alloy is 1500°F and the mold pre-heat temperature reaches approximately 700°F. After pouring is completed, the operator allows approximately 2½ minutes cooling time before removing the casting from the mold.

The die for the header weighs four tons, stands seven feet tall, and requires a press with a locking pressure of 50,000 pounds between the two sections of the die during casting. A special ejector system has been designed specifically for the operation to insure straightness of the part during removal from the mold. The auto manufacturer has specified tolerance for the parts of 1/16 inch for overall length and general contour.

With a package wash base of dependable, uniform consistency, the permanent mold operator need not concern himself with problems of mixing his own formula from base materials. Nor does he have to make subsequent allowances for wash consistency differences when pouring the metal to obtain an 80 micro-inch finish.

Enterprise Brass Works thinks the 'dag' 193 is ideal for its large mold applications. Many of the insulation and release hazards in casting parts of unusual shape or contour were eliminated by the vermiculite dispersion which clings tightly to the die with a long-lasting, uniform film.

■ *Front header production by permanent mold casting at Enterprise Brass Works calls for care in casting thin sections that occur in this part. At left, operator sprays both cavities of the mold with 'dag' 193. No difficulty is experienced in taking the casting from the mold. Front headers are shown at right.*

THE AC TECHNICAL STAFF LOOKS AT FLUIDITY

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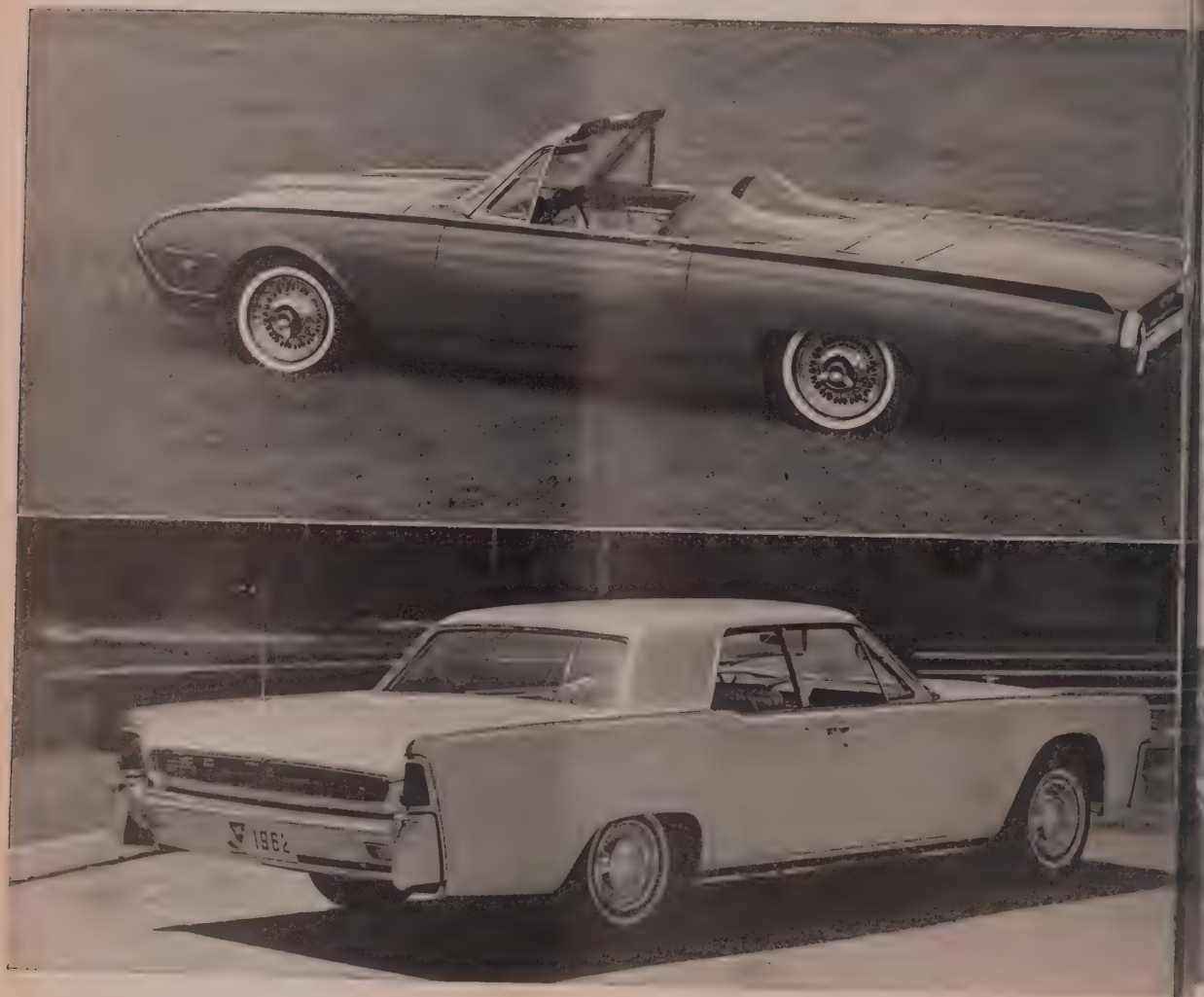
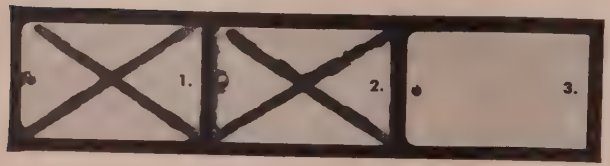


Ford Motor Company's luxurious Lincoln Continental and fabulous Thunderbird have established new heights of fine car performance while creating "classic" standards in motor car design.

GRANODINE—The obvious difference in pre-paint treatments



1. Solvent-cleaned—panels failed after 100 hours of accelerated testing.
2. Alkali-cleaned—panels failed after 100 hours of accelerated testing.
3. Granodine-treated—panels excellent after 336 hours of accelerated testing.

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Phosphatizing process key to producing rust-proof bodies, long lasting, quality paint finishes

At Ford Motor Company's Lincoln Continental and Thunderbird production plant quality manufacture is the by-word as experienced craftsmen turn out the last word in automotive style and performance.

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*Amchem's registered trademark for its conversion coating chemical used to produce phosphate coatings on steel.

Body in white in metal finishing area prior to phosphating.

Granodine-treated body at exit end of phosphate washer.

Phosphatized body is seen in final paint line.

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MAGNESIUM

bids for bigger share of commercial markets

Exhibit of over 150 commercial uses at meetin of Magnesium Association highlights industry aim to boost non-military applications. Missil and space craft uses also emphasized. Gains i alloying and processing techniques detailed

DIXIE Walker took a couple of practice swings, then dug in at a make-believe home plate, glowered at the non-existent pitcher, and aimed a fence-busting swat at an imaginary fast ball.

The scene was the Magnesium Association meeting at New York's Belmont Plaza Hotel in mid-October, and the former Brooklyn Dodgers outfielder was demonstrating a magnesium baseball bat that could be lofting pop flies to the outfield and drilling line drives through the infield in countless little league games next summer. It might even see service at the spring training camps of some major league teams.

The magnesium baseball bat was the star attraction of the exhibit, "101 Commercial Uses of Magnesium," at this year's annual meeting of the Association. The extensive exhibit, probably the most massive display of magnesium applications ever assembled in one room, symbolized a revitalized industry, intent on capturing a heftier share of non-military markets for structural materials.

"The enormous variety of applications dramatically emphasized magnesium's versatility," declared Harry N. May, vice president of Standard Magnesium Corp., Tulsa, Okla. "We are only sorry that a magnesium exhibit of this sort has not been available for display t metalworking industries in general

May helped organize the exhibi which actually featured more tha 150 non-defense uses of magnesiu — everything from an ambulan carrying chair, artificial limbs, bow ing pins and binoculars, to foundr flasks, furniture, lawn mowers an luggage. Also on view were suc prosaic products as cameras, clothes dryer, various hand tool ladders, printing plates, skillet skiis, toys, typewriters, and a Volk wagen engine.

■ *Star attraction of the "101 Commercial Uses" exhibit was a magnesium baseball bat. Shown here: Stan Brown (center), developer of the bat and president of Newark (Ohio) Processing Co.; former Brooklyn Dodger outfielder Dixie Walker (left), who has joined Brown in the venture; and C. A. Howe, of Hills McCanna Co., Chicago, president of the Magnesium Association.*

Aluminum Firms Beware

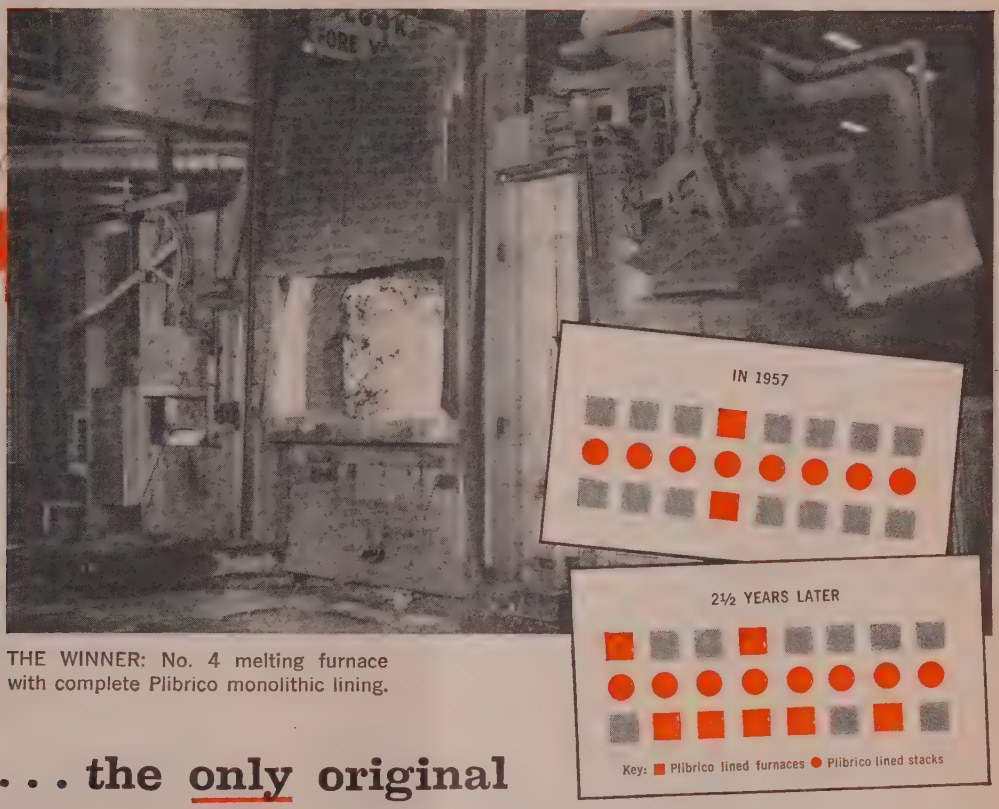
A cursory examination of the ex hibit revealed the surprising exter to which magnesium has penetrate markets thought to be the exclusiv domains of other metals. And one o the featured speakers at the meetin urged the industry to step up it efforts in this direction.

Major J. P. Ball, head of th British firm, Magnesium Elektron advised his colleagues to make mag nesium price competitive with alu minum in tonnage markets. He hin ed that this would give magnesiu the edge in many applications be cause of the metal's lighter weigh superior machinability, and its faste die casting rate.

Major Ball noted that the U. S has lagged behind some Europea countries in the growth of magnes um consumption. Since 1952, h pointed out, magnesium consump tion has doubled in England an quadrupled in West Germany, whil per capita use of the metal in thi country has remained at about th .66-pound level it was just after th Korean War.

He suggested that the U. S. pro ducers and fabricators strive to ge "a magnesium article in ever

Major aluminum producer* tested 8 different furnace linings on a diet of molten aluminum



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home." The purpose, apparently, would be to generate acceptance of magnesium at the consumer level by acquainting the general public with its many advantages.

This "grass roots" approach has been exploited effectively by the aluminum industry, with household foil serving as the "goodwill ambassador." The magnesium industry has yet to come up with a product that offers the mass market appeal of foil, however.

Even if such an application could be found for magnesium, the success of the campaign would depend not only on competitive pricing, but also on the type of sound market development and strong promotional effort that has paid off for aluminum. As the aluminum producers have discovered, there is no easy way to gain a foothold in new markets.

70% In Commercial Uses

It seems more likely that future gains in magnesium consumption will proceed gradually on a broad front—the mode of market development that created the applications exhibited at the Association meeting this year. And it should be noted that this approach has yielded worthwhile results.

Up until 1955, defense applications accounted for better than half of total consumption of magnesium in structural uses. "Today," according to the Magnesium Association, "more than 70% of the total magnesium consumed for structural uses appears in everyday products for industrial, commercial and consumer needs."

A good example of optimum exploitation of magnesium's strongest selling points is in portable chain saws. Aluminum has been the main structural material in chain saws. But aluminum weighs about 55% more than magnesium, and light weight is extremely important in this application.

By switching to magnesium, manufacturers have trimmed the weight of chain saws, making them truly portable tools. Today you can buy a magnesium saw weighing only 19 pounds and costing under $150.00. Other advantages of magnesium in an application such as this include superior machinability and the faster rate at which the metal can be die cast, using new developments such as automatic metering of metal to the die.

Magnesium is at its competitive best in die casting applications, and Dow Chemical is stepping up its campaign to sell this concept to auto makers. An automatic die casting setup can produce magnesium parts 1.5 to 3 times as fast as aluminum castings made by the conventional hand ladling methods. Manpower per part can be reduced by as much as 50%, according to Dow.

The automotive market is a tempting target, and the German-made Volkswagen is an impressive demonstration of the potential for magnesium in cars. About 36 pounds of magnesium die castings are used in the VW. It has been estimated that if U.S. auto makers used magnesium to an equivalent extent, they would consume better than 120,000 tons of magnesium per year.

Though there is scant hope of approaching this potential in the forseeable future, the magnesium industry aims to give both aluminum and zinc a stiff competitive battle for automotive applications.

Those Baseball Bats . . .

A market with intriguing possibilities is the booming sporting goods field. Magnesium is thought to stand a good chance in such products as bowling pins and skis, but the baseball bat is the front-runner at present. Developed by Stan Brown, president of Newark (Ohio) Processing Co., it is presently a sand casting. In production it could be permanent mold cast, but Brown hopes it can be made from magnesium tube—probably by swaging and spinning. This would slash production costs and permit better control of final weight.

Early production models sounded like a gong when they connected with a baseball. A filling of foamed plastic remedied this, and a plastic coating makes the new model look very much like a traditional bat.

A number of major leaguers who have tried the bat said it performed just like the familiar white ash bat except that there is no painful sting—even in cold weather. But the magnesium bat will long outlast the wood model, and can be made more uniform in weight. Its price, according to Stan Brown, will range between $11.00 and $15.00.

Brown and his partner, Dix Walker, have set their sales sights on the amateur baseball market (schools, Little Leagues, etc.), which use some 2 million bats a year. The sales pitch: The dramatic reduction in outlay for bats. Brown figures a Little League club can cut its bat costs 75% in the first two years by stocking eight or ten bats of varying weights and sizes.

Although major league rules specify that wooden bats must be used in competition, individual teams could cut their bat costs by using magnesium bats during spring training and in batting practice during the regular season.

Alloys and Spacecraft

While pursuit of commercial markets was the theme of this year's meeting, the magnesium industry is not neglecting the missile and spacecraft business. At the opening session Dow Metal Products Co. revealed that magnesium will be used extensively in the Ranger spacecraft designed for landings on the moon.

Magnesium components of Rangers 3, 4 and 5 include six main chassis boxes; some 80 sub-chassis boxes of an electronic omnibus section; six main support legs; an inter-connecting structure; and a large adapter ring for the craft's antenna.

Several significant alloying and processing developments were detailed in technical papers given at the meeting. Many of these will be reported in future issues of Modern Metals.

New magnesium alloys containing 11% or more of lithium were discussed by Paul D. Frost, Division Chief, Battelle Memorial Institute. The new alloys, which are about 20% lighter than magnesium and more ductile, could prove especially useful in reducing booster weight for missiles and space craft, Frost pointed out.

Other developments to be reported in later issues include: A new finishing system for magnesium castings; adhesive bonding of magnesium; chemical milling magnesium; methods of strengthening light alloy castings and forgings; and recent advances in forging magnesium.

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Melting pure aluminum in a 120-KW Ajax-Tama-Wyatt Channel-Type Melting Furnace and pouring into a small holding, hand-ladling furnace.

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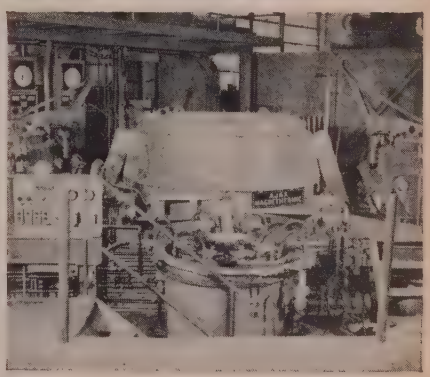
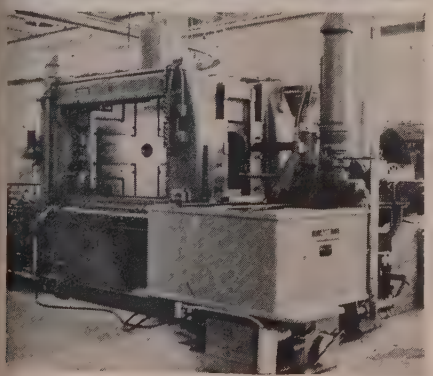
This Ajaxomatic twin-hearth furnace automatically pours aluminum into die casting machine. Unit is charged at one end with solid metal and automatically pours molten metal into die casting unit on a precise time cycle.



Melting scrap and ingots in Ajax-Tama-Wyatt Furnace for pouring into batches of 10,000 lbs., and semi-continuously casting billets using an Ajax-Tama-Wyatt Holding Furnace.



Lad-L-Melt is a two-chamber furnace for use with die casting machine.

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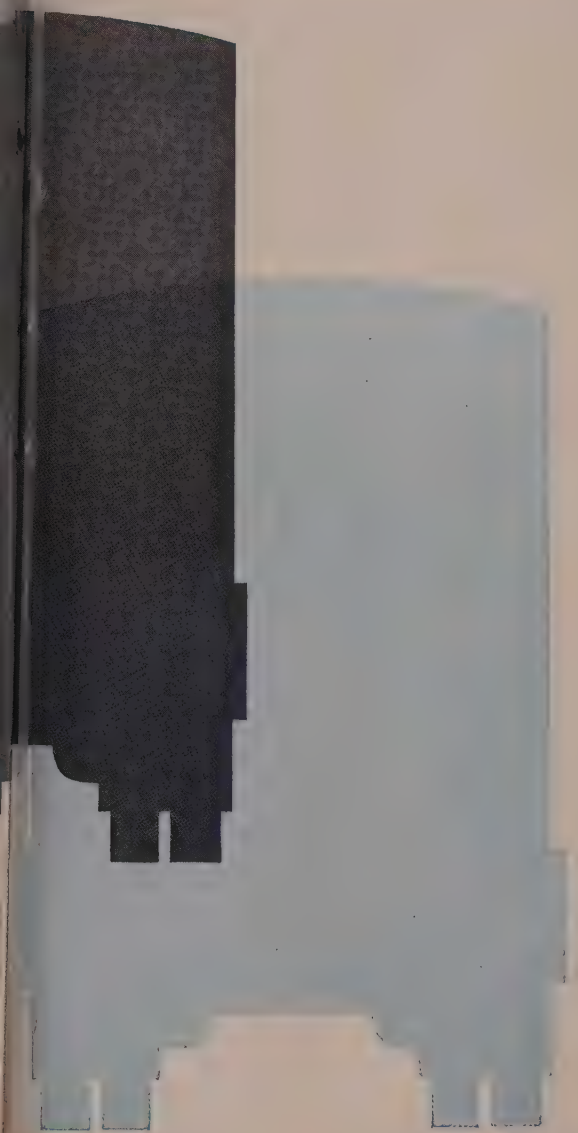

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LUMINUM SHEET

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ALUMINUM PRESSURE VESSELS

Production capacity of ammonium nitrate has increased greatly in past few years, creating big market for aluminum transportation vessels, piping and storage tanks, but design considerations are numerous.

by R. H. Haines, Project Engineer, Reynolds Metals Co., Richmond, Va.

A LARGE potential exists for aluminum in transportation vessels, piping and storage tanks for ammonium nitrate (NH_4NO_3) solutions.

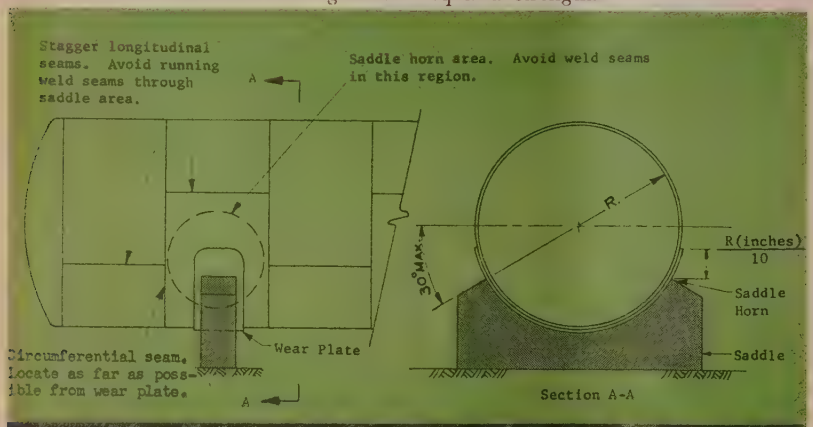
Capacity to produce NH_4NO_3 has greatly increased during the past few years and the material is often transported and stored in aqueous solutions. Ordinary carbon steels are subject to rapid corrosion by the solutions, but many aluminum alloys perform well in the presence of NH_4NO_3.

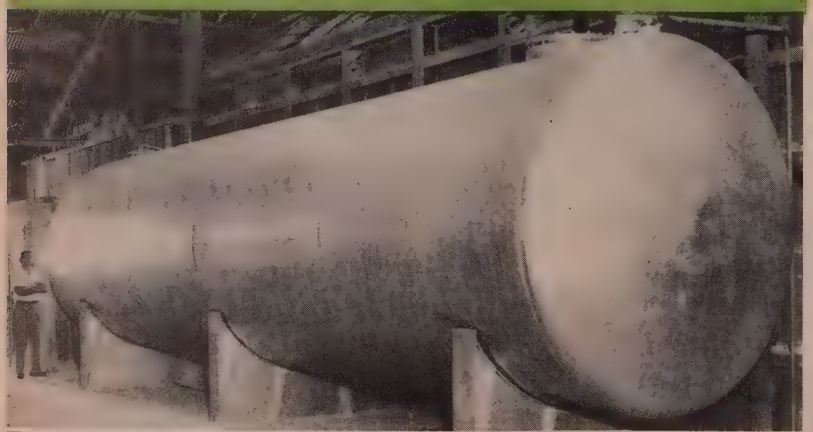
In designing aluminum tanks for use with the solutions both applied stresses due to tank contents and characteristics of the solution contained must be considered.

Ammonium nitrate solutions are often heated in order to achieve greater concentrations, and the temperatures vary considerably. In general, vessel operating temperatures are at least 100°F though they exceed several hundred degrees in some vessels.

Solution concentrations also vary, with most being from 40% to 83% (by weight) of ammonium nitrate. Both anticipated operating temperature and concentration of tank contents must be considered in choosing the proper aluminum alloy for an NH_4NO_3 vessel (see Table 1).

If solution temperatures do not exceed 150°F and NH_4NO_3 concentration does not exceed 40%, most common aluminum alloys are satisfactory; the choice is largely determined by economics and required strength.





■ **Huge ammonium nitrite solution storage vessel of welded aluminum construction. Drawing above shows weld seam arrangement of this vessel in critical saddle area.**

As operating temperatures go abo 150°F or concentration above 40%, t various alloys must be examined so t corrosion resistance of each mater can be used to the fullest advantage.

The magnesium content of the loy becomes increasingly critical as te perature and solution concentration i crease. Therefore, operating conditio should be closely defined for allo 5052, 5083, 5086, 5154 and 5454. (ASM Unfired Pressure Vessel Code does n list properties for alloys 5083 and 50 above working temperatures of 150° or for 5154 above 300°F.)

Generally, alloys 1060, 1100, 30(3004, and 6061 may be considered f the uppermost temperatures and co centrations. (Table 2 suggests gener alloy groups for various ranges of o erating temperatures and solution co centrations. For convenience, grou temperature and concentration lim are rather sharply defined but in pra tice the dividing lines indicating a ceptability for a particular alloy wou be less distinct. However, the table a satisfactory reference guide.)

Welded Storage Tanks

For welded tanks, the ASME Unfir Pressure Vessel Code lists allowab stresses for aluminum alloys based the annealed (O) temper of the ma rial, with 6061 as the one exception. is suggested, however, that a hard temper be specified for tank shells. will not allow any higher design stress to be used in overall vessel design, b greater resistance to incidental loc forces and against local buckling c be expected.

For tanks constructed from non-he treatable alloys, the quarter-hard or ha hard temper is recommended. Unle forming operations are the limiting fa tor, heat treatable alloys should be us in the —T6 temper.

Normally head blanks must be "(temper due to the amount of formi required. Subsequent forming of he blanks will at least partially increa the overall temper, but the degree hardening of the section may not uniform. If a heat treatable alloy specified for the head, "O" temper w

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probably be necessary for forming reasons, although increased strength can be achieved by heat treating after forming.

Occasional localized forces as well as operating stresses should be considered in choosing a head thickness.

The same criteria can be used for choosing the correct alloy for aluminum pipe as are used for determining the proper plate alloys. Normally available pipe (1060, 1100, 3003, 6061, 6062, 6063) is acceptable; final choice hinges on required strength and relative costs.

Aluminum fittings should not be overlooked. For Code designs, forged fittings in alloys 3003, 6061 or 6053 are satisfactory. Alloys 1060, 1100 or 6151 could be considered in cases not governed by the Code. These alloys function quite well throughout the whole range of temperature and concentration usually encountered in handling NH_4NO_3, so again final choice is based on desired strength and price.

You Can Use Cast Fittings

Cast fittings have also been used successfully. However, they are limited in Code design vessels because only alloys 43 and 356 are accepted by the Code Committee.

Shell and head thicknesses for tanks under pressure may tentatively be determined by using the ASME Pressure Vessel Code formulas. However, designing a tank solely on the basis of the Code formulas does not automatically guarantee a satisfactory vessel.

Code formulas only consider the effects of internal or external pressure. But stresses due to the weight of the tank and its contents, as well as "beam-action" for a horizontal tank on supports, must be considered.

See *Stresses in Large Horizontal Cylindrical Pressure Vessels on Two Saddle Supports,* Zick, Welding Journal Research Supplement (1951); *Process Equipment Design,* Brownell and Young, Wiley & Sons, 1959, for guides in determining the proper methods of analysis for cylindrical horizontal pressure vessels on two or more supports.)

For any analysis investigate all possible loading conditions in determining maximum applied stresses. Test conditions and operational conditions must be checked. For many tanks built to contain a fluid under internal pressure, the non-pressurized condition may be most critical. Such a condition could result from testing, system malfunctions, or a change in the end use of the vessel.

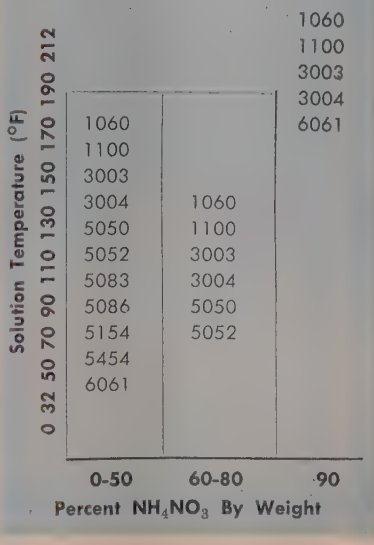
It should also be remembered that tanks designed to contain a fluid with a specific gravity less than one, may be tested with water. Thus the test condition may be the most critical case. Ammonium nitrate solutions will almost always have a specific gravity greater than one.

Any cylindrical tank supported horizontally will tend to deform in cross-section so as to become partially elliptical. This should be considered in determining whether or not ring stiffeners or internal bracing are necessary to preserve vessel roundness when such reinforcement is not needed for strength. Shell thickness will also affect the distortion of a cylindrical tank.

TABLE 1: Water Solubility of NH_4NO_3 At Various Degrees F

Temp. °F	Approximate Composition Of Saturated Solution $\%NH_4NO_3$ (By Wt.)	% Water
32	55.4	44.6
40	58.3	41.7
50	61.2	38.8
60	64.0	36.0
70	66.4	33.6
80	68.8	31.2
90	71.0	29.0
100	73.0	27.0
110	75.0	25.0
120	76.9	23.1
130	78.6	21.4
140	80.2	19.8
150	82.0	18.0
160	84.0	16.0
170	85.6	14.4
180	86.8	13.2
190	88.1	11.9
200	89.3	10.7
212	91.2	8.8
220	91.8	8.2
230	92.8	7.2
240	93.8	6.2
250	94.3	5.7

TABLE 2: Alloys for Various NH_4NO_3 Applications



As a rule a minimum of 0.250-inch thick metal should be used for horizontal tank walls whose diameter exceeds 48 inches in order to prevent excessive deformation and for resistance to local buckling and occasional external forces.

Thinner walled vessels should be closely scrutinized. The tank heads have some stiffening effect on the shell so that greater cross-sectional deformation can be expected in areas away from the heads unless additional bracing is used.

To limit cross sectional deformation in horizontal cylindrical tanks applied stresses should be kept below the metal's proportional limit. Although stresses above this limit do not necessarily mean the vessel will fail structurally, such stresses will magnify tank deformation because the modulus of elasticity decreases as stress increases beyond the proportional limit. Naturally some permanent "set" will also occur when the proportional limit of the material is exceeded.

When considering the deformation aspect of a horizontal tank, note that the ASME Code values for allowable design stresses for wrought aluminum alloys in the "O" temper do not necessarily fall below the metal's proportional limit. For example, the Code allows a design stress of 6250 psi for 5052-0, while the proportional limit is about 3200 psi. To avoid complications resulting from such cases, the "O" temper of an alloy should be avoided in tank shells.

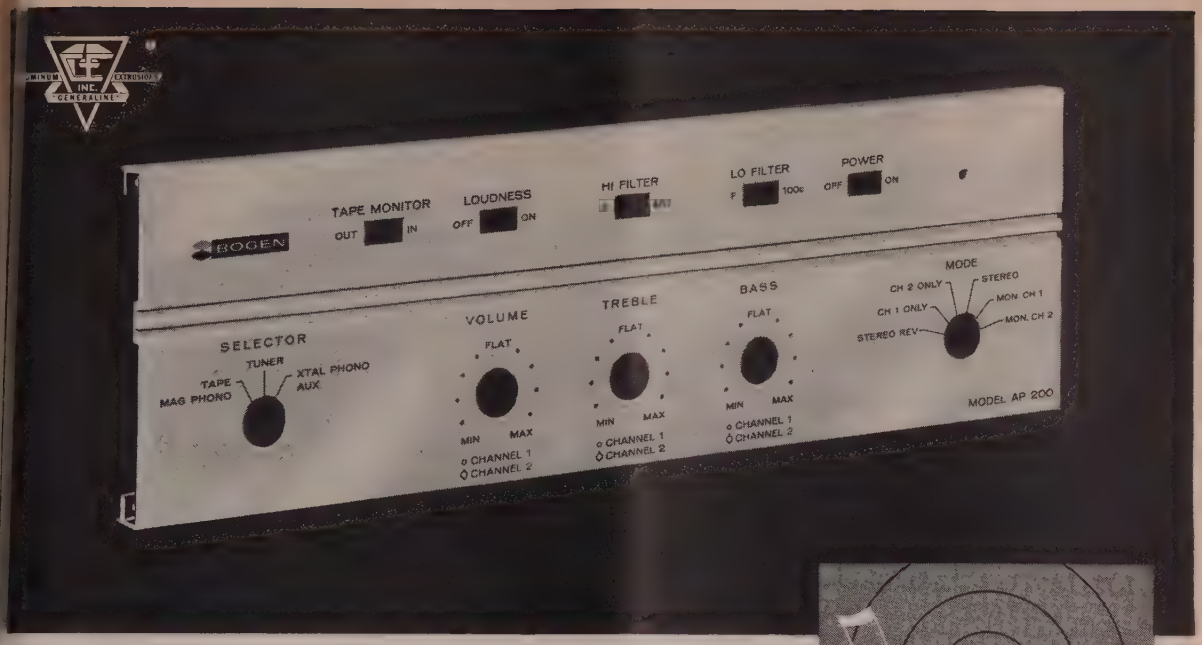
In welded tanks the seams must be staggered. Care should be taken to locate seams as far as possible from saddle supports in horizontal tanks. The area just above the saddle horn is usually a region of high stress due to circumferential bending stresses, so particular care should be taken to prevent placing weld seams in this region (see diagram, p. 44).

In general, butt joints are more desirable than lap joints. For ASME certified tanks, refer to ASME Unfired Pressure Vessel Code, Section IX, for welding procedure, filler wire, etc.

Watch Tank Drainage!

Tank drainage is important. If baffles are used, they should allow free flow between compartments. Any obstruction which prevents free drainage or impounds the solution can result in corrosion problems.

Do not overlook drainage from internal bracing. Structural members should be placed so that legs do not obstruct free flow of solution while emptying tanks. It is desirable to provide a sump in the tank bottom to insure complete emptying of horizontal vessels. If possible, provide a slight slope in horizontal tanks toward the sump for efficient, complete draining.



BOGEN'S

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Bogen-Presto is one of many manufacturers of electronic products who use GEI extrusions for decorative and functional purposes. They know they can rely on GEI to meet exacting specifications in design. This is because GEI has the precision craftsmen and the facilities to produce the exceptional in aluminum shapes. As an example, GEI not only extrudes and anodizes the AP200 face, but it also does the punching for switches and control dials. Why don't you consult with GEI about your extruded aluminum needs—whatever the shape, whatever the quantity, one part or a million?

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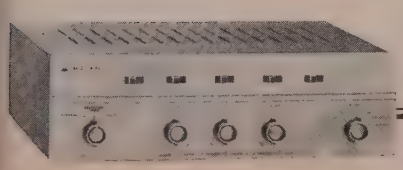
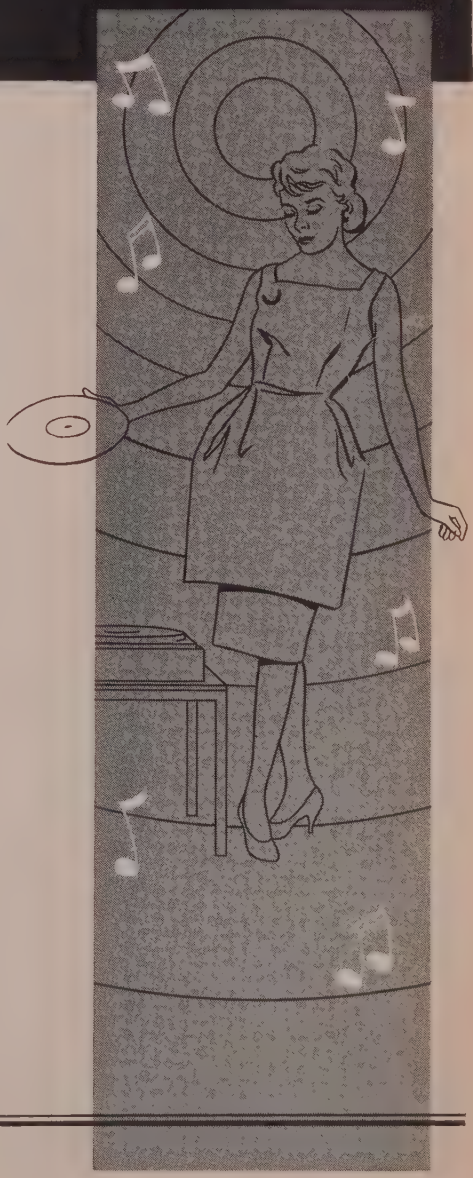
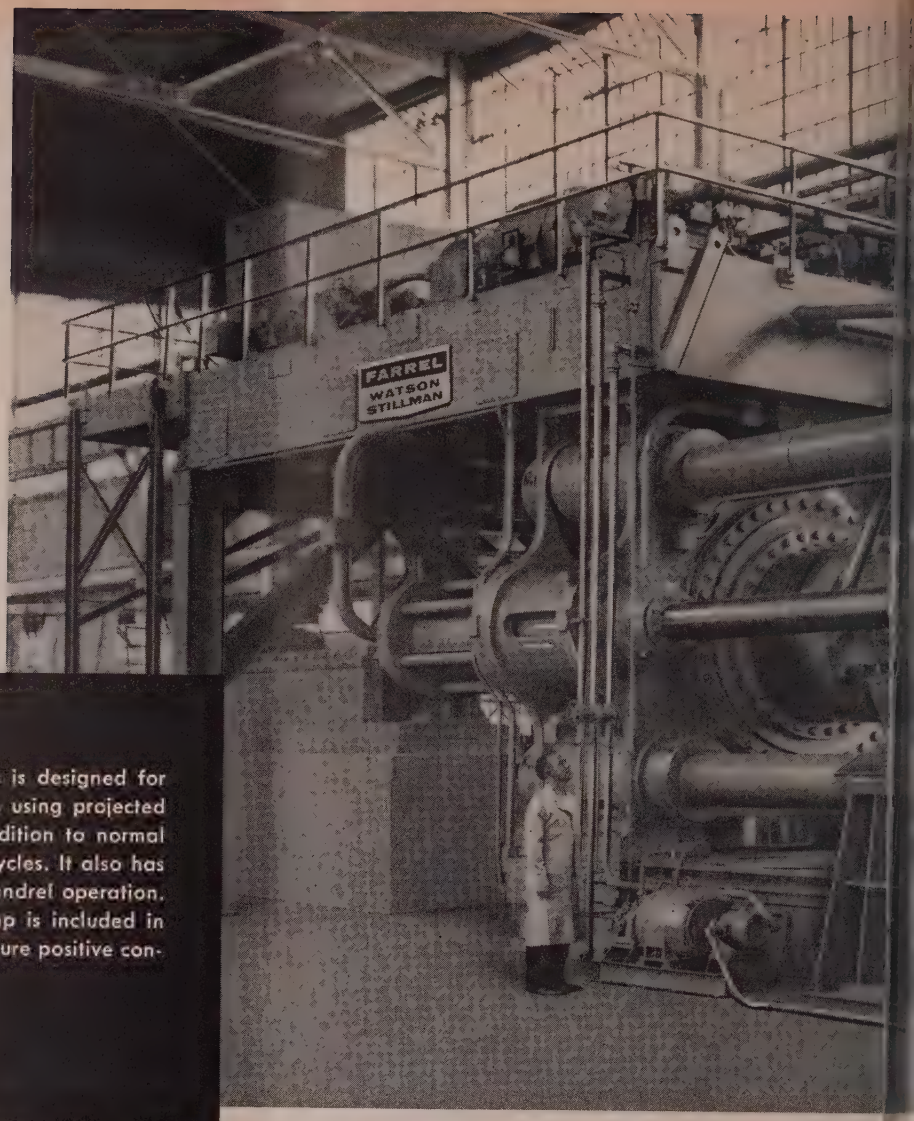


With this Bogen Model AP200 Stereo Amplifier-Control Center, the discriminating listener can precisely control all stereo sources—FM-AM, Multiplex tuner, tape recorder, phono or auxiliary.





The 4500-5000 ton press is designed for automatic cycle operation using projected "bridge-type" dies in addition to normal "solid" and "porthole" cycles. It also has an automatic cycle for mandrel operation. A separate 5000 psi pump is included in the hydraulic system to insure positive container sealing.

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SPECIFICATIONS

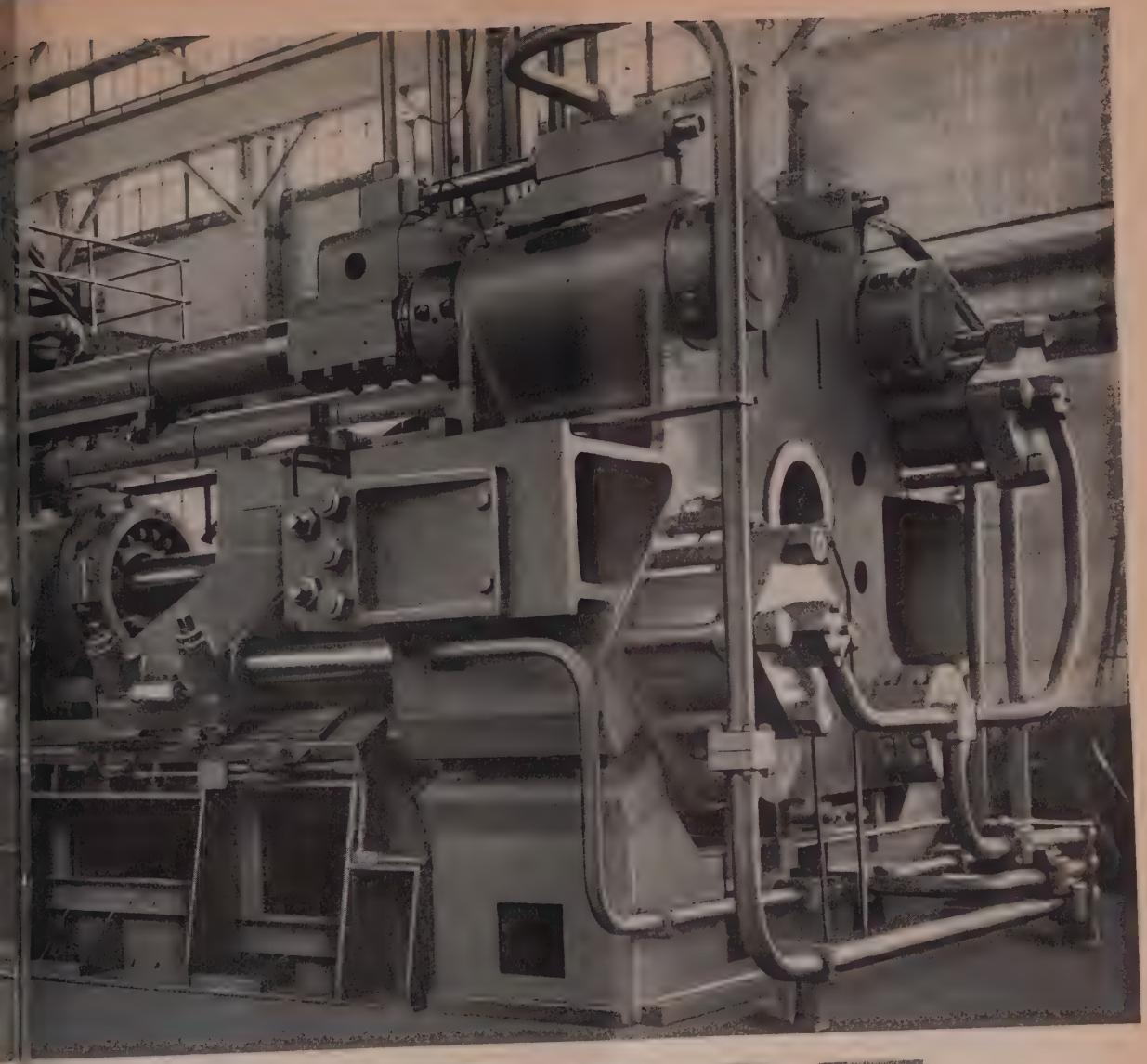
Maximum billet size	18" x 42"
Cylinder pullback capacity	560 tons
Cylinder stripping capacity	950 tons @ 5000 psi
Sealing capacity	635 tons @ 5000 psi
Butt shear capacity	200 tons
Mandrel capacity	630 tons
Maximum extrusion speed @ 3600 tons	67" per min.

This 4500-5000 ton extrusion press is the largest of its type in the world. Designed and built by Farrel Watson-Stillman, it weighs more than 575 tons and, when equipped with the runout table, is 220′ long. It has an over-all height of 25′ 3″ and a width of 28′.

To be installed at the Richmond, Virginia, plant of Reynolds Metals Company, this press will increase their production potential to more than 3,000,000 lbs. of extruded products per month. These will include shapes up to 14″ diameter or width, such as aluminum light standards for expressways, sections for railroad cars and truck bodies, tubing, conduit and pipe, and wall panels for building construction.

The Reynolds press illustrates Farrel Watson-Stillman's capacity to build heavy equipment. It is the latest

modern-metals_1962-01 17 12



LARGEST

ydraulic aluminum extrusion press

addition to the company's rapidly expanding line of extrusion presses which now range in capacities from 500 to 5000 tons and larger.

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FACTORS AFFECTING
the formability of aluminum

Technical paper covers the influence of work hardening and warm forming on yield strength and ductility of alloys; gives tips on press brake bending, selection of alloys. General Dynamic's magnetic metalforming process also discussed in paper presented at Light Metals Symposium at U.S. Army Engineer Research & Development Labs, Fort Belvoir, Va.

by Robert A. Ridout, Manager, District Engineering, Kaiser Aluminum & Chemical Corp.

FORTUNATELY the formability of aluminum and its alloys is high. For example consider elongation as one measure of formability. Commercially pure aluminum (alloy 1100-0) will have an elongation, in a 2-inch gauge length, in the range of 30%.

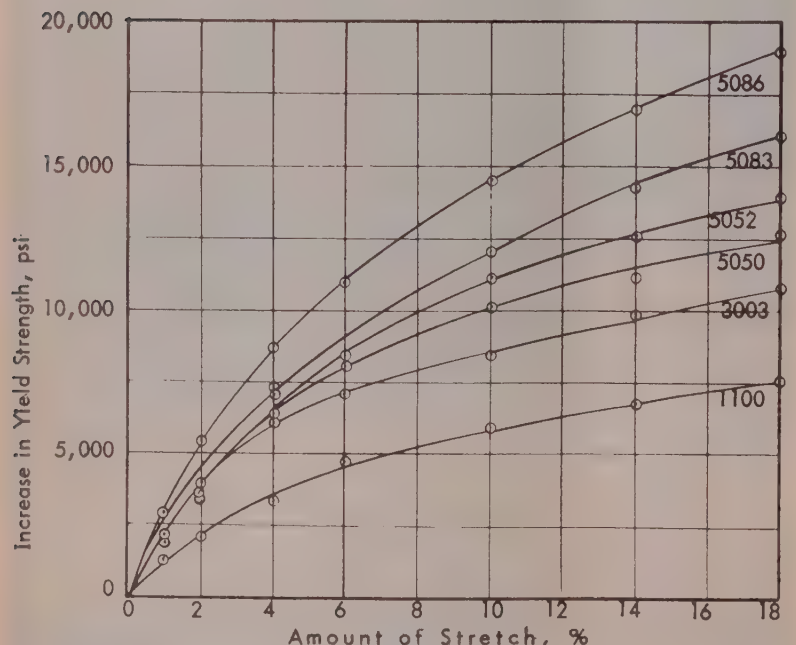
This material is also exceedingly ductile. It can be drawn, spun, bent or beat into almost any desired configuration. While certain more highly alloyed materials have "good" formability, they do not possess the ductility of commercially pure aluminum.

As a generalization it may be said that any alloying constituent added to aluminum increases its strength but lowers its formability. The same can be said regarding the numbe of constituents added to the alum num base as well as their percentag of the total. A good indicator of th is the increase in the minimum ben radius required for alloys as the strength is increased by the additio of more alloying elements or larg percentages of a given element.

Adding alloying elements to al minum also increases its work har ening rate – the degree of improv ment in yield and tensile strengt for a given amount of cold wor Fairly good substantiation of th generalization is provided by th graph in Fig. 1, showing yie strength improvement due to stretc ing.

Fig. 1: Improvement of Yield Strengths Of Aluminum Alloys Due to Stretching

(all alloys stabilized after stretching)



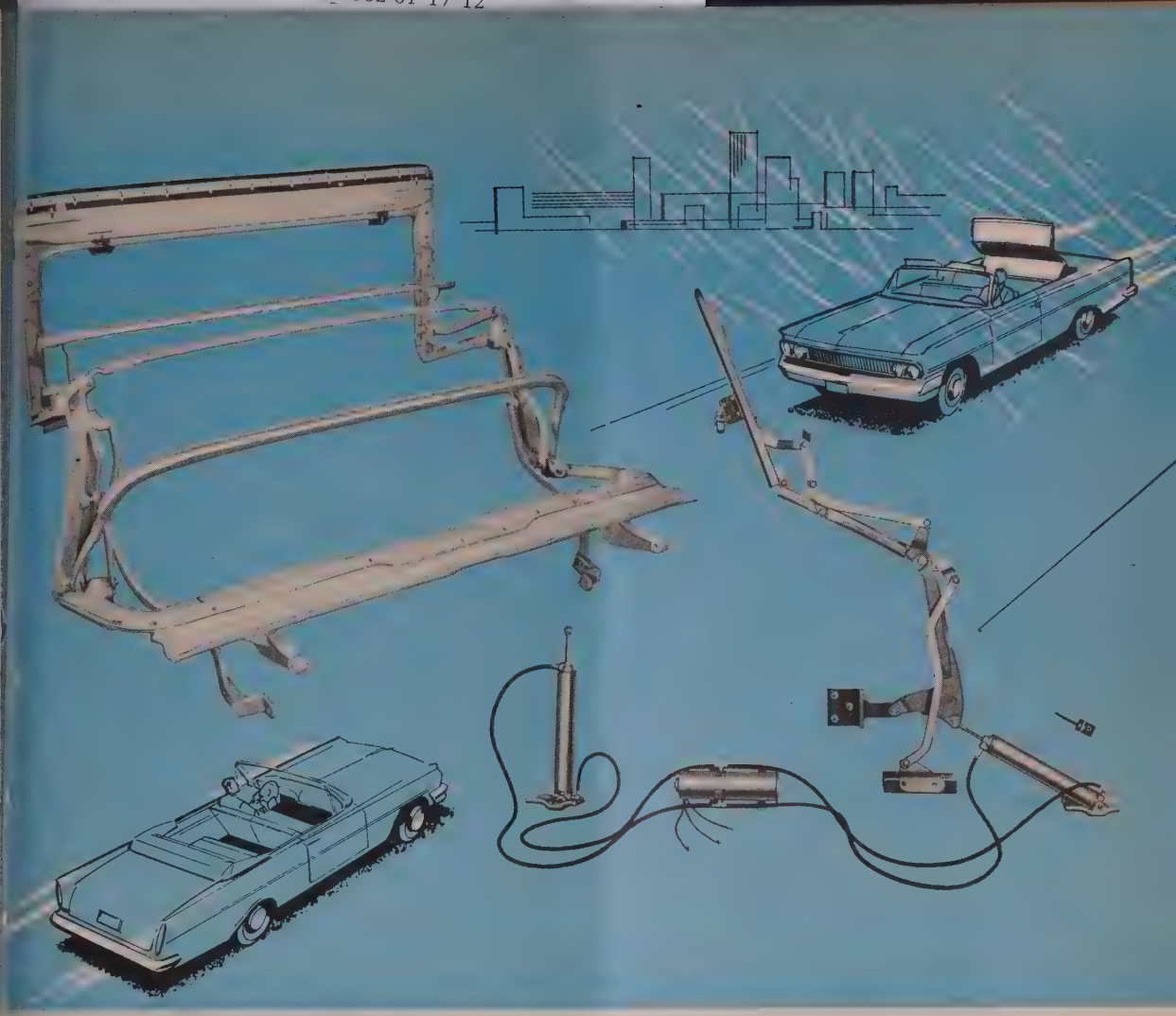
By Department of Metallurgical Research, Kaiser Aluminum & Chemical Corp.

An Exception to the Rule

One exception is brought to ligh here. Alloy 5086 shows a larger i crease in yield strength than do 5083, even though the percentage alloying elements in 5083 is greate

But our generalization is su ported by Fig. 2 (page 52), sho ing yield strength after stretchi annealed materials. Note that a though the increase in yield streng in pounds per square inch was gre er for 5086 than for 5083, the actu yield strength of 5083 stayed consi ently above that of 5086, and th the plotting of yield versus percen age of stretch again lends creden to the generalization regarding pe centage of alloying elements.

There has been one serious pro lem connected with the stretch for



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ing of some high strength alloys. Lueders lines or stretch strains have plagued the fabricator who chose to stretch alloys such as 5052, 5086 or 5083.

This problem was presented to Kaiser's Department of Metallurgical Research. Excerpts from their report, "Tensile Properties of Aluminum Alloy 5086 After Warm Stretching at 300°F and 400°F," read as follows:

". . . Interest has been expressed in stretching at elevated temperatures. However, in considering warm stretching, it was important to know what effects it would have on the resultant tensile properties of the material at room temperature. Consequently, a program was carried out to determine the tensile properties of 5086-0, -H32 and -H34 after warm stretching under conditions of heating and stretching similar to those which might be employed during stretch forming operations."

Warm stretch forming data were obtained by stretching 5086-0, -H32 and -H34 in the range of 8-12% at 300 and 400°F, and determining the resultant tensile properties at room temperature. For material stretched and tested in the longitudinal direction the following significant effects were observed.

1. After stretching 12% at 300°F, the yield strengths were increased by 80% for 5086-0, by 17% for 5086-H32, and by 4% for 5086-H34.

2. After stretching at 400°F, the yield strength of 5086-0 was increased by 44%, while 5086-H32 and -H34 were decreased by 9% an 18%, respectively.

3. For a given amount of stretc and at a given temperature, th highest overall yield strength w obtained after stretching 5086-H3 In fact, tensile properties aft stretching 5086-H34 at 400°F we about the same as those after stretc ing 5086-0 and -H32 at 300°F.

4. There appeared to be little a vantage in using -H32 as the initi temper for warm stretching sin practically the same properties we obtained by stretching -0 temp material.

5. Warm stretching had relative small effects on ultimate tensi strength.

Enough Ductility Remains

6. As expected, residual elong tions were decreased in cases whe yield strengths were increased b warm stretching. However, the d crease was generally much less tha the amount of stretch, and the du tility retained was considerab greater than that which would b retained after stretching at roo temperature. Residual ductility aft stretching is important, not on from the standpoint of the design the finished part, but also in ste forming operations. If good duct ity is retained, a second stretch m be obtained without intermedia annealing.

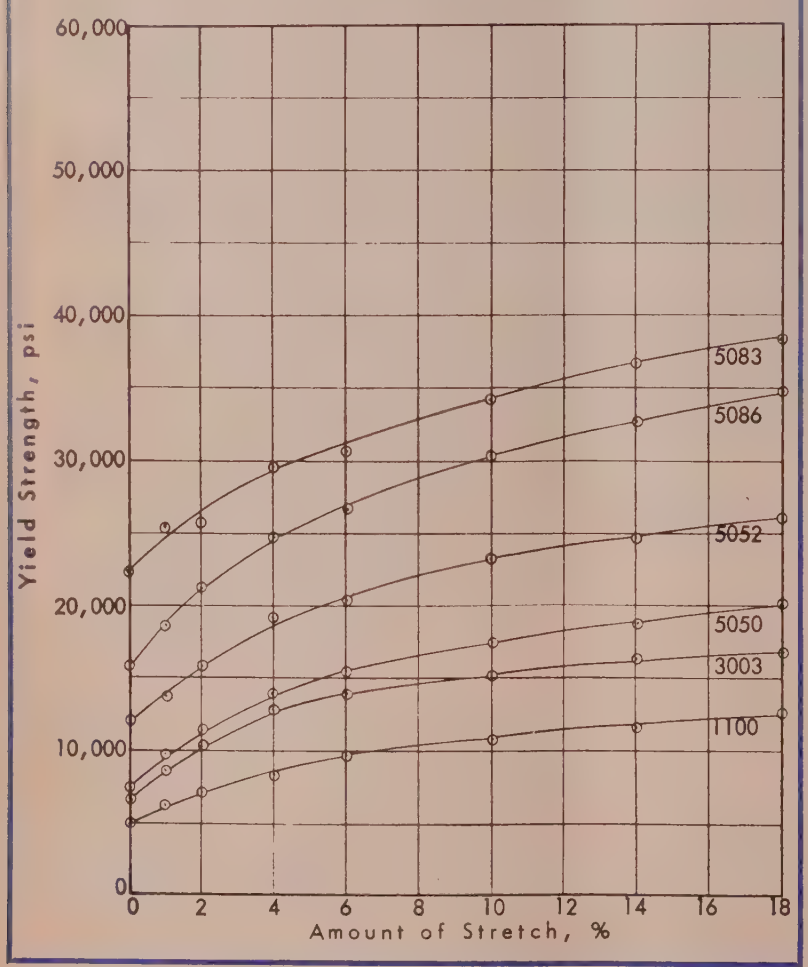
7. It appeared that tensile prope ties after warm stretching were e sentially stable and would not b subject to significant "age softenin as in the case of cold worked mat rial. This was also indicated b residual ductilities, which were co siderably higher after warm stretc ing than after stretching at roo temperature.

8. Strain markings, a common o jectionable characteristic of 50 when stretch formed at room tempe ature, *did not* occur during war stretching at 300° and 400°F.

9. Tensile properties at room te perature after heating only for sho periods ranging from 0.5 to 30 mi utes were also determined for co parison with the properties aft warm stretching.

10. Metallographic examinati revealed that warm stretching 400°F caused a decrease in visib grain boundary precipitation in t

Fig. 2: Yield Strengths After Stretching Annealed Aluminum Alloys
(all alloys stabilized after stretching)



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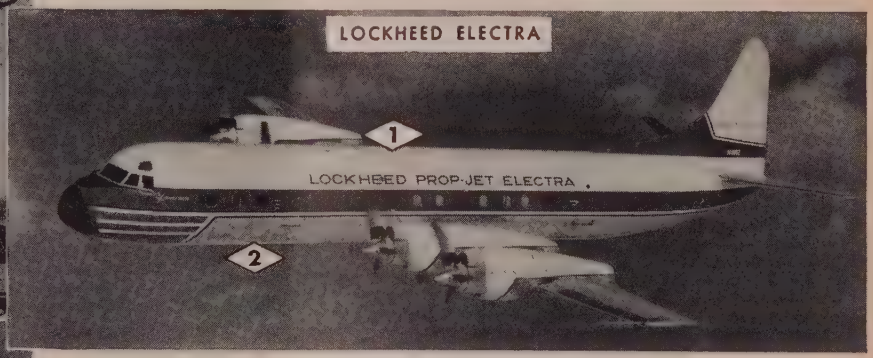

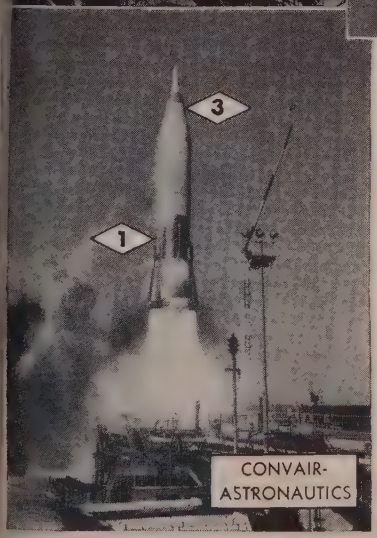

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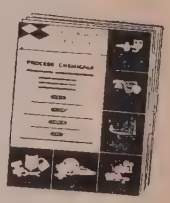

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-H32 and -H34 temper materials. Heating, only, for the same time had no noticeable effect.

The tensile and yield strength properties gained from this investigation are invaluable but of equal importance is the discovery that strain marking did *not* appear as a result of stretch forming. This could be a distinct advantage when appearance and surface smoothness are important in the finished product. Incidental to all this is the fact that while the metal is at the elevated temperature the yield strength is lower. This in effect increases the actual capacity of the available stretch forming equipment.

Stretch press forming may be considered exotic in some circles, but one type of forming used by almost all fabricators of aluminum is simple bending of the press brake variety.

For Press Brake Forming . . .

A bend of this sort demands that the outer fibres of the metal be capable of handling a given level of stress, which is directly proportional to the thickness of the metal and inversely proportional to the radius of the bend. (As the thickness of the metal increases the stress level increases, but as the radius of the bend increases the stress level decreases.)

The alloy must possess sufficient elongation to accommodate the increase in length required at the outer surface of the bend when compared to the unchanging neutral axis of the bend. This available elongation generally decreases with the increasing strength of alloys, and with the increase in temper of an individual alloy specifically.

The practical solution to bend radii considerations is to design to those specified bend radii for the alloy and temper required to fulfill the other major criteria of the end product. These bend radii are readily available as general published data.

Aside from specifying the proper bend radius, it is important that the V dies have smooth radii over which the metal can move. Roughened surfaces on the V die radii tend to grab the metal and restrict its movement. This, in effect, forces the aluminum to provide the required amount of elongation from an inadequate length of material.

The result is a fracture, or at least a severe "orange peel" condition on the outer surface of the bend because the locked-in shorter length of metal could not provide sufficient elongation to meet the imposed demand.

Tangent Bending Corners

For larger radii than are obtainable on the press brake under normal conditions, tangent bending offers an excellent method of forming the corner bends of all types of metal cabinetry and closures. Since the metal is rather gently moved around the form block by a forming pad which maintains a position always tangent to the forming radius, the forming stresses are not materially increased beyond that which is essential to cause the metal to take a permanent set. Hence this method is ideal for forming most aluminum alloys.

Drawing aluminum through one or more dies to create a circular or odd shaped container has been a highly successful method of producing an end product or component. It has been said for many years that 1100-0 is the best deep drawing aluminum alloy available.

Investigation by Kaiser's District Engineers indicates that although 1100-0 is the most ductile aluminum alloy it is not necessarily the best deep drawing material in all cases. Many instances of tensile failure at the punch nose (where the sidewall is experiencing the greatest localized strain) can be rectified by employing a material with an increased ultimate strength.

Use a Stronger Alloy?

A case in point required that a 6½-inch aluminum container be drawn to 9 inches deep from .050 gauge material. Rules have been established to assure that the thickness of the blank be of such a ratio to the diameter that there will be sufficient cross section in the side wall to withstand the drawing pressures.

Tensile failure in the part could be avoided by increasing the metal thickness to provide the required cross section in the side wall, or by using three drawing operations instead of two. The engineering of the ultimate end product precluded the first approach and economics production precluded the second.

Since the problem was one of te sile failure it remained only to su stitute an alloy and/or temper f the 1100-0 which would have enou formability to make the part a enough ultimate strength to wi stand the imposed tensile load the side wall.

The obvious choices were 30 H12 and 5050-0. After successf trials on both, the latter was chos for its better finishing characteristi

Explosive forming, hi-veloci forming, or high energy rate for ing present possibilites for prod ing parts beyond the scope or size conventional press equipment. Ev this generalization breaks down cause at least one piece of equipme (Dynapak) has emerged in a size a with the operating ease capable competing with the general li metal press.

High energy rate forming h been accomplished with dynami with many special shaped charg and with highly compressed gas Its ability to produce complicat shapes is almost phenomenal; ability to produce some more co mon shapes leaves much to be sired.

Magnetic Metal Forming

There is at least one other ne and interesting metal forming pr ess worthy of some discussion. It known as Electromagnetic Met forming. It shows some real promi in metal swaging in particular a in metal forming in general. It reputed to improve performan and cut costs for the swaging of e fittings into push-pull control ro for example.

The part is actually shaped b electromagnetic energy. Electric energy is stored in a bank of capa itors and then quickly discharg through a coil, creating a high i tensity magnetic field around t coil. The reaction of the force c ated by this field against the pa results in controlled deformatio Any metal workpiece which is plac in, around or near the coil will b subject to some deformation, d pending on its proximity to the c and on the size and shape of the c and the work piece.

Actually, the high intensity fie

he coil induces a current in the k piece, which, in turn, creates cond magnetic field which inter- with the magnetic field pro- ed in the coil. As a result there rapidly applied force trying to h the part away from the coil.

Placing the coil on the outside of tubing creates a compressive ce that tends to collapse or shrink tube. Placing the coil on the in- e of the tube tends to bulge or oand it.

eal for Aluminum

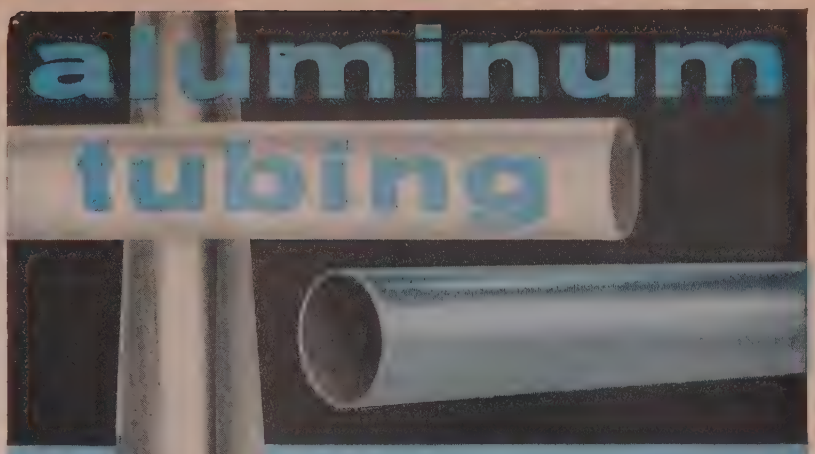
The metal part may also be placed tween a pancake coil and a die or m block in which case a current lse through the coil will force the tal into the die or form block. this technique metal may be npled, blanked, embossed or en- aved. The high electrical con- ctivity of aluminum should make one of the easiest of materials to rm by this process.

This patented electromagnetic etal forming process is a recent de- lopment of the General Atomic ivision of General Dynamics Corp. he equipment consists of a preset- ble capacitor charging power sup- y, an ignition switching circuit, a apacitor bank, and a coil (see page 7). The total energy available to erform the work depends on the ze of the capacitor bank.

For swaging T-4 aluminum tub- ng 1.625-inch O.D. and smaller hav- ng a wall thickness of 0.125 inch r less, an electromagnetic swager would be 6 ft. long x 3 ft. x work- ench height and would weigh about 000 lbs. Forming or swaging 0.125- nch aluminum requires 15,000 oules or 1200 ft.-lb/in.^{2} delivered o the work in approximately 50 mi- roseconds.

Magnetic field energy densities equivalent to 100,000 lb./in.^{2} have been reached in the coils. Strain rates are in the range of 10-50 me- ters/sec. A machine about half this size is big enough for swaging elec- trical connectors onto cables.

Coils have inside diameters up to three inches with lengths up to four inches; flat coils have been con- structed with six inch diameters. "Single shot" coils have been built for swaging where the work piece could not be placed inside a normal coil. A flat coil is now being made



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afety precautions are those nor-
l to high voltages and charged
densers, but the power supply is
ormal 110 or 220 volt source.

The repetition rate of experimen-
machines is on the order of one
ging operation per minute. With
ling and higher power input, it
uld be possible to speed this up
one operation per second.

EDITOR'S NOTE: The foregoing cription deals with experimental ts. For details of the first commer- lly available magnetic forming ma- ne, see the box at right.

Some of the unique characteristics electromagnetic metalforming at may well earn it a respected sition in the metalworking indus- , include:

1. Noncontacting. Electromagnet- force provides a swaging or ex- nding operation without touching e material. There is no contami- tion, scratching, marring or dam- ing of the surface and thus no rting point for fatigue failure. he work can actually be done rough the walls of a container.

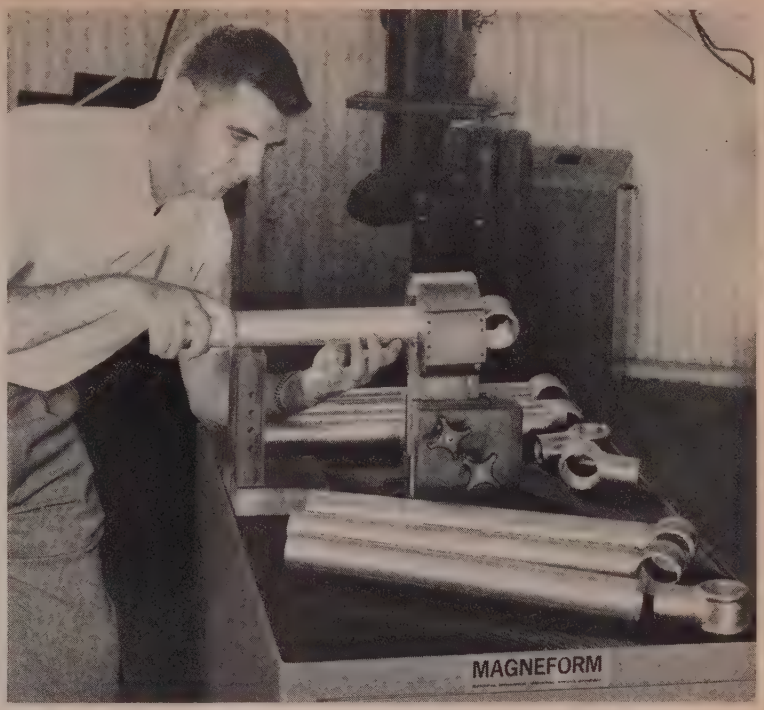
2. Freedom of location. Swaging expansion can be done anywhere ong the length of the workpiece — the center of a long length of bing, for example, without affect- g the ends.

3. Reproducibility. The energy vailable* is dependent only on the apacitor rating and the charge volt- ge. Capacity is fixed and the volt- ge can be duplicated exactly, per- itting precise reproducibility from iece to piece with the same coil.

4. Uniformity or nonuniformity f applied force. The coil can be esigned to provide a uniform pres- ure on the object being compressed r expanded, or it can be designed o provide a nonsymmetrical force n either or both the circumferential r longitudinal directions.

There are other processes, both ld and new, by which aluminum an be formed. It requires only the election of the right alloy, the ap- lication of good design and fabrica- ion by an appropriate forming sys- em to produce a light weight, du- able product of the highest quality.

*The force (impulse) exerted on the work piece is dependent on condenser capacity, charge voltage, coil characteristics, and the conductive properties of the work piece material.



Magnetic Metalformer Shapes or Assembles Aluminum Components Without Touching Them

A lightning-fast impulse of electromagnetic energy is the force used to shape or assemble metal parts in a radically new metalworking machine built by the General Atomic Division of General Dynamics Corp., San Diego, Calif. Called Magneform, the unique machine is now available to industrial users on a lease basis.

Magneform applies a powerful magnetic field against the workpiece in pulses of 10 to 20 millionths of a second, creating pressures of up to 50,000 psi. These huge, instantaneous pressures can be used to collapse, shrink or compress tubing, attach connections to rope or cable, or to swage together sections of telescoping tubing.

In the application pictured above, two aluminum components are joined swiftly and securely. The outer tube is pressured into all indentations and over all protrusions of the other part, assuring a positive fit.

In other applications the magnetic pressure will expand tubing to form a tight fitting bearing or hub. No scratching, marring or other surface damage occurs because there is no need for physical contact between the part and the coil that produces the magnetic field.

Quick-change coils permit the unit to perform several successive operations such as forming, swaging, expanding, shearing, dimpling, blanking, embossing and coining.

The current Magneform can perform one operation every 6 seconds, including re-charging of the capacitor. It is adaptable to remote control, and can be integrated into an automated production operation.

Magneform measures 4 feet by 2 feet and stands 3 feet high. It uses a conventional 220-volt, 60-cycle power source. Cylindrical coils up to 6 inches long and up to 6 inches in diameter can be accommodated by the current model. Flat coils up to one foot in diameter have been used so far in the machine, but bigger coils can be used.

Magneform can also be used to assemble products such as small electric motors, transformers and loudspeaker magnet assemblies. In assembling an electric motor, for example, a specially designed coil creates a pulse which compresses an aluminum band radially and axially around the motor components and folds over the ends of the band to assure a tight fit.

General Atomic is now leasing the Magneform machine to industrial users for approximately $6000 per year. The lease charge includes maintenance service.

■ *Lee O. Greene, general manager of Alumaroll Inc., and Art Monson, plant superintendent, inspect the roll coater used in applying Alodine pre-paint treatment. They say it offers many economies.*

Rolled-on conversion coating saves

time — money — space — maintenance

Alumaroll considers its roll-coat method of applying Alodine conversion coatings a complete success; is so impressed with the advantages over dip or spray that it will install a 24-inch coating line soon.

FASTER application of conversion coatings to aluminum and steel coiled strip, virtually no waste of coating compound, closer control of coating quality, more flexible production scheduling, simpler maintenance of application equipment, and a big reduction in space occupied by conversion coating equipment.

These are the main advantages realized by Alumaroll, Inc. since the company installed a compact roll-coating machine in the pretreatment department of its Rutherford, N. J. plant. The new installation applies conversion coating solution to coiled strip, which is then roll-coated with vinyl or alkyd enamel. The pre-painted strip is used in the production of awnings, siding and other home improvement products.

All That Waste!

It's easy to understand why roll-coating is more economical than spray application of conversion coating solution. In the latter operation the strip is uncoiled under tension and pulled through a covered tank where the solution is sprayed from many jets against top and bottom surfaces of the metal. This "blanket" application applies more solution than is actually needed or used. It would be difficult to gauge the volume wasted, but waste there is.

The roll coat method is superior for other reasons, according to Art Monson, plant superintendent at Alumaroll.

"In the spray method the effluent, including used solution coming off the surfaces of the metal, is returned to the main reservoir," Monson explained. "In time the solution becomes contaminated and weakened, and so requires replacement with fresh solution to maintain proper strength of the bath. This variation in strength can result in coating variation."

One-Time Use

In the new system at Alumaroll, the conversion coating is contained in 55-gallon plastic containers. This solution is always the same strength because no excess solution is returned to the reservoir. Therefore solution strength on the coater rolls remains constant.

■ *After the Alodine is roll-coated on the metal and squeegied and rinsed, the aluminum is dried under this bank of infrared lamps in preparation for painting.*

Greater flexibility in productio is another advantage of the roll-coa ing technique. For instance, if t line is coating steel and an alum num run is scheduled, all that ne be done is to change the solution the two roll pans.

Steady Feeding

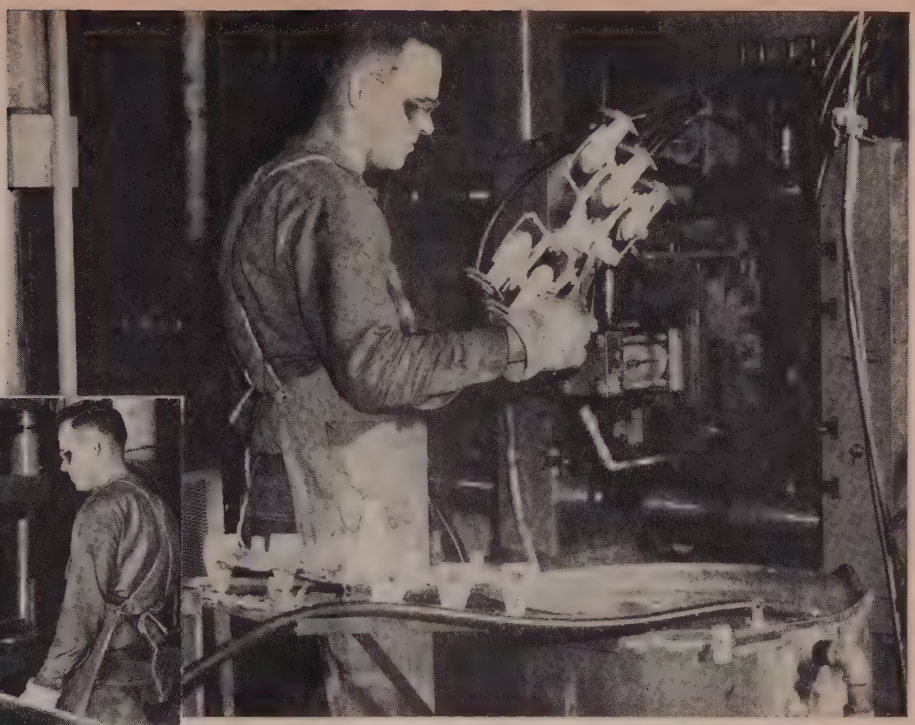
This is done simply by emptyi the pans and tapping in the Alodi 1200-T (or other suitable Alodi formulation) from the two 55-gall drums located near the roll coate A metering pump feeds the solutio to the coater at a constant rate.

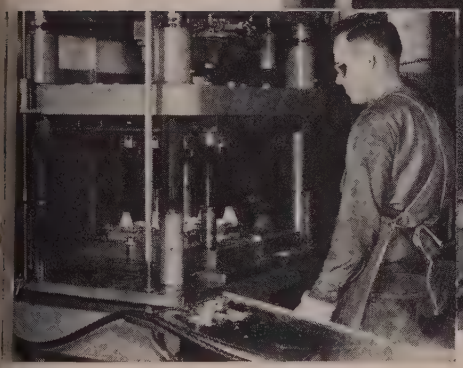
Flexibility can also mean ease changing the amount of solutio deposition on the metal being pro essed. By adjusting the coating ro Alumaroll can vary the wet film required and get a heavier lighter deposit without changing s lution strength.

The new technique provides st another kind of flexibility.

"At the present time, we ha three Alodine formulations whi can be applied to aluminum by t roll-coat technique," said F. P. Spr ance, Jr., sales vice president Amchem Products Inc., developer the new system. "It's possible, the fore, to apply one formulation to t top side of the strip, while, f certain considerations, another f mulation can be rolled onto the b tom side.

"Then, too," Spruance continue "the line speeds are not necessar always constant. For instance,





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■ *Two polyethylene tanks for mixing Alodine solution feed the roll coater below. These tanks and roll coater replace the dip or spray apparatus through which the aluminum coil traveled in previous conversion coating operation.*

Alumaroll they use basically two different finishes — for one application a solution vinyl and for the other a modified alkyd. These two finishes require different curing cycles. Since Alumaroll's oven length is fixed, they must operate at two widely varying line speeds.

"With the conventional application method, either too much or too little Alodine coating would be applied at the different line speeds. With the roll-coater it is very easy to meter out the proper amount of Alodine for the given line speed, thus maintaining the same coating weight, regardless of the strip speed."

Maintenance economies are an important consideration in comparing dip or spray-applied conversion coating with roll-coating. The new system eliminates the large stainless steel tank used in the dip process, and the controls and motors used to replenish the bath. Also eliminated would be the need for constant titration of solution strength.

Less Plumbing

"The savings are even greater over the spray system because of the elimination of piping systems for the spray nozzles," Monson said. "Another item would be the cleaning effort required to keep such a system at peak efficiency. On the other hand, we have run successfully for more than six months without resurfacing the rubber rolls."

The new system is a tremendous advance over the original Alumaroll practice of cutting awning slats from bare aluminum strip, hand-rubbing them with carbon tetrachloride and steel wool, and then painting them in a spray booth.

Narrow Width, Now

The installation will handle coil up to 14 inches wide and coating speed can be up to 150 rpm.

A 24-inch coating line is planned for the near future. Although wash and rinse stages in the conversion coating section remain unchanged, the new roll-coating stage saves about two-thirds of the floor space formerly required for the spray or dip stage, and so reduces the time required for treatment from 15 seconds to five.

After being coated with Alodine the strip is dried under infra-red lamps and painted in a conventional paint roll-coater. Two colors may be applied in the same pass (a different color on each side). At present, Alumaroll is running 14 different colors for its awnings and seven for its siding products.

Both roll coaters are developments of J. O. Ross Engineering Co.

"It is possible to use a conv tional reverse roll coater," said L O. Greene, general manager of A maroll Inc. "However a smal more economical, specially b coater is recommended."

The painted coil is baked in a zone oven. Immediately after baki the strip is quenched with cold w which hardens the paint and enal the strip to pass over a water-cool chrome plated drum for furt cooling.

On To Security!

The strip is then rewound and ready for forming. Much of it is livered to Security Aluminum C Detroit, Alumaroll's parent c pany, manufacturer of alumin awnings, patio roofs, siding a other home improvement produ

Depending on the thickness a width of the coil, Alumaroll can r 35,000 to 40,000 pounds of alu num through its new line in working day.

To sum up, Alumaroll is reap an impressive array of econom The pre-mixed solution has a m lower concentration because none it is recovered. Thus, there is need for a safety margin — usu achieved by a stronger solution t is needed to accommodate ste weakening by contamination.

The afore-mentioned is a rec nizable economy. Then there are indirect savings through redu maintenance, less controls, less h ing of large quantities of solut for correcting to operating temp tures.

Add to this such plusses as f dom from cleaning sludge fr tanks, clogged nozzles, less waste o to poor coatings or overcoating o to emergency stops in tanks.

Perhaps the biggest initial c saved is the price of a rectify unit, an important item of equ ment in a large coil coating pla

"Easier and neater housekeep problems resulting in a cleaner op ation with increased quality a production are not to be overloo as economies," Monson said. "Di savings in chemical material us are presently estimated to be 20 25% when compared to dip a spray operations.

"We at Alumaroll are pleased have helped pioneer the Alodine coater method."

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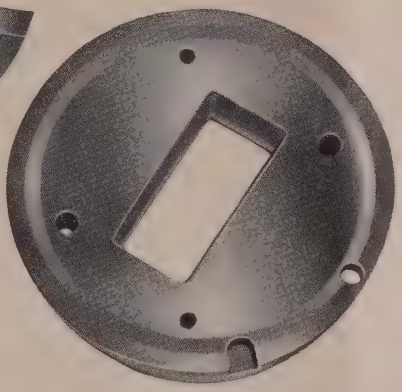

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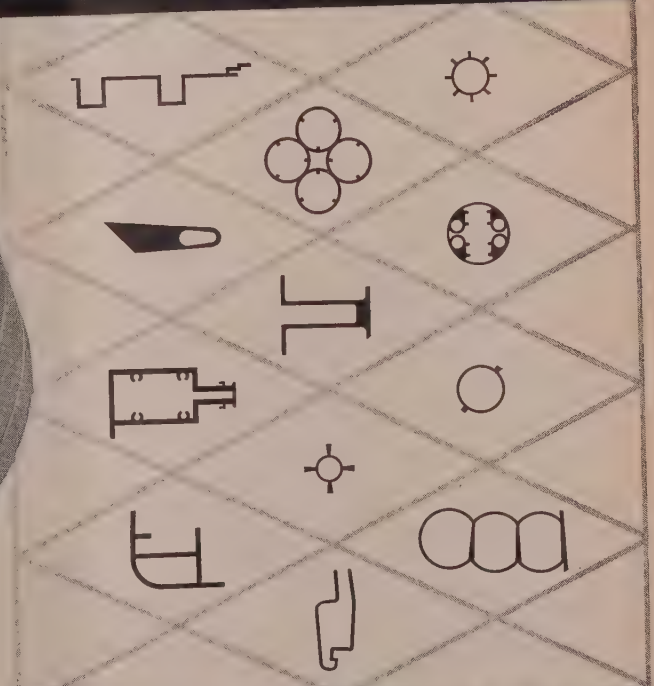

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Lift Trucks Solve Handling, Storage Problems for Nonferrous Distributor

FORK lift trucks have been fitted with booms and slings to solve handling and storage problems in the shop and warehouse of a nonferrous metal distributor in the east.

The results: A 30% saving in storage space; simplified hauling of cumbersome plates, tubes and other forms to and from the warehouse; and a satisfactory solution to the problem of removing out-sized shipments of metal from trucks and trailers. The ingenious handling technique is in use at Metal Supply Co., Philadelphia, Pa.

An important segment of the company's business is the supplying of special cut to-order blanks to metal fabricators. This processing requires frequent moving of large plates of aluminum, copper and brass to and from storage. To minimize handling time, a supply of the most commonly used thicknesses is stored by leaning plates against the wall in the shop.

Stock stored in this manner is moved to a layout table and then to a shear or high-speed band saw by a 2-ton capacity electric Clark lift truck equipped with a boom and chain sling.

Plate is maneuvered manually to a vertical position so the chain sling can be placed around the plate's balance point. Then the lift truck boom is raised, tightening the sling. The plate swings to a horizontal position when the boom is lifted and is moved to the proper work station, where the machine operator positions plate before it is lowered.

After sawing or shearing, the unused portion of plate is returned to storage by the boom truck.

The boom-and-sling technique handles plates without marring their finish, an important consideration when working with soft, expensive stock. Overhead cranes or hoists were ruled out for this job because of the shop's physical layout.

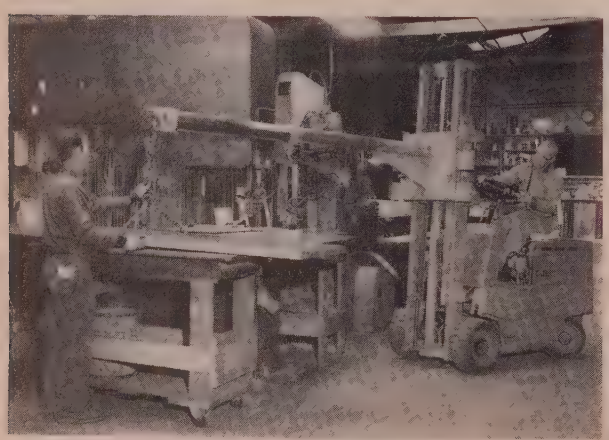
The boom on the electric lift truck is fabricated from 5-inch diameter steel tube welded to a plate which slides onto the fork carriage. The 7-foot long boom can be extended by adding a two-foot section when required.

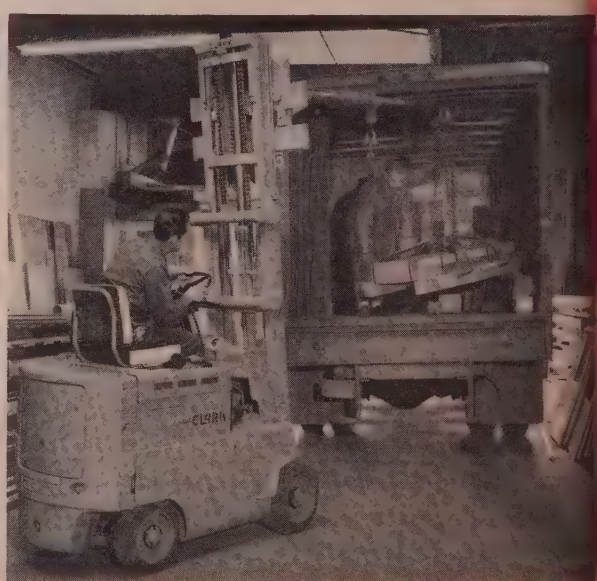
A non-extendable and non-detachable 7-foot long boom is installed on another fork truck, a 5-ton capacity LP gas-powered unit built by Clark Equipment Co. This Cla Utilitruc is used in the warehouse t handle skids holding loads of met plates, as big as 60 by 144 inche

Skids are constructed with bolste extending lengthwise under th loads. For this reason, they canno be handled with conventional fors because the load center would b extended too far for safe handlin

Instead, skids are picked up b grab hooks attached to the boom o the Utilitruc. This unit handle skids weighing as much as 500 pounds when they are suspended a the end of the 7-foot boom. Th boom can be raised as high as 1 inches to handle skids which a stacked 8 to 10 feet high in the war house to conserve space.

Booms offer another advantage i the warehouse. They reach easil into trailers to deliver or receiv loads, and reach behind skids t pick up strapped bundles of roc and tubing which are stored by lea ing them against warehouse wall Ceiling clearance in the warehous permits vertical storage of the bundles, a space saving metho which frees needed floor area.





■ *Chain sling on end of lift truck boom (above) is attached to metal plate near center of balance so machine operator can easily position aluminum plate on saw table. At right, grab hooks on chain sling attached to end of lift truck boom facilitate loading and unloading in warehouse. Boom easily extends into truck body.*

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JOINING MAGNESIUM, PART 3:

MECHANICAL FASTENING

Arc welding of magnesium (metal-inert-gas and tungsten-inert-gas) was detailed in Part 1 of this report. In Part 2 we dealt with resistance welding and brazing. This section on fastening concludes the series.

From Information In "Joining Magnesium" (Booklet 141-216) By the Dow Metal Products Co., Div'n of The Dow Chemical Co., Midland, Michigan

MECHANICAL fasteners used in the joining of magnesium include rivets, screws, bolts, quick-release devices and inserts. Production techniques for using them with magnesium are dealt with in this section of the report.

Riveting has long been the most widely used mechanical joining method. Riveting procedures for magnesium are essentially the same as for other metals. For best results, some special consideration should be given to design of joints, choice of equipment and materials, driving of rivets and sealing of joints.

Joint design. Minimum edge distance and rivet spacing are illustrated in Fig. 1. For most applications the minimum distance from an edge to the center-line of the first row of rivets should be 2.5 times the rivet diameter. If the sheet was sheared or blanked an additional allowance may be desirable because of the unfavorable effect of rough edges on fatigue life.

Minimum distance between rivets in any direction should be about three times the rivet diameter. Maximum spacing depends entirely upon type of structure and its overall design.

Design considerations for flush riveting magnesium sheet are shown in Fig. 2. Single shear strengths, in pounds, of aluminum rivets are given in Table 1. Bearing strengths, in pounds, of riveted joints in various magnesium sheet alloys are calculated by multiplying the sheet thickness times the rivet hole diameter times the bearing ultimate strength of the alloy used. Bearing ultimate strength of the various sheet alloys are as follows:

AZ31B-H24	— 77,000 psi
AZ31B-0	— 66,000 psi
HK31A-H24	— 66,000 psi
HK31A-0	— 58,000 psi
HM21A-T8	— 63,000 psi

Equipment and tools. Rivet holes should be drilled in magnesium with a drill bit sharpened to a 60° included angle, and with the drill web thinned (see Fig. 3). Holes can be pierced in sheet thinner than 0.040-inch, but drilling is preferred. Standard countersinking tools can be used.

For Hot Dimpling Sheet . . .

If light gauge sheet is to be dimpled for countersunk riveting, use hot dimpling sets equipped with electrically heated dies and automatic time and temperature controls. For dimpled sheet use countersunk rivets with standard 100° included head angle. For machine countersunk sheet use any of the standard included head angles.

When dimpling sheet for countersunk riveting, the dimpling dies should be heated to 550-600°F. They heat the area to be dimpled by contact during a controlled dwell and forming cycle. Do not allow dwell time to exceed 5 seconds, or the sheet may be over annealed. Dimpling pressure should be adjusted so that a strip about 1-inch wide will remain flat while the line of dimples is being made.

Use 5056 Alloy Rivets

Magnesium should be riveted with 5056-H32 alloy aluminum rivets. With this alloy there is less tendency toward galvanic corrosion. (A special high purity variation of 5056 alloy is being investigated for riveting the magnesium-thorium alloys.) If 5056 alloy rivets are not available, use either 6053-T61 or 6061-T6 alloy rivets.

Rivet length should be equal to total material thickness to be joined, plus 1.00 to 1.25 times the rivet diameter. It's better to use a large number of small rivets than a few large ones. Make sure the rivets fit snugly in the holes (suggested drill sizes for various rivet diameters are given in Table 2).

Aluminum rivets up to 5/16-inch diameter may be driven cold. Ease of driving 5056 alloy rivets varies with temper, but the -H32 temper is satisfactory for all normal riveting operations. For maximum holding strength the driven head diameter should be at least 1.3 times the rivet diameter.

Squeeze riveters are preferred over pneumatic hammers because they give more accurate control of driving pressures, better centering of heads, more consistent rivet strength, and they minimize damage to sheet from overdriving.

Bolts, screws and similar fasteners are used to join magnesium to dissimilar metals and wood. Fasteners made of 5056 aluminum are preferred, followed

Table 1: Single Shear Strength of Aluminum Rivets (lbs.)

Aluminum Alloy	Rivet Size (inches)							
	1/16	3/32	1/8	5/32	3/16	1/4	5/16	3/8
6053-T61	77	159	285	437	630	1141	1802	2578
5056-H321	95	195	350	536	774	1400	2210	3160
6061-T6	102	210	376	575	830	1504	2370	3395

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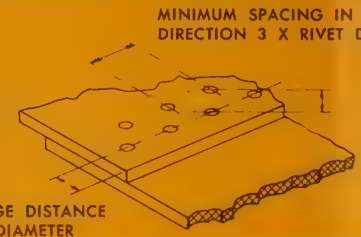
HARVEY ALUMINUM SALES, INC., Torrance, California

Fig. 1: Recommended Minimum Edge Distance And Rivet Spacing When Riveting Magnesium



by 6061 alloy. Cadmium plated or zinc plated steel may be used if the environment is not severely corrosive.

Coarse thread bolts and screws are preferred to fine threads. Self locking nuts and many types of quick-release fasteners are particularly useful on magnesium. Aluminum washers (5052 alloy) are used under bolt heads and nuts.

Two Types of Inserts

Screwed-in inserts of two types are used in magnesium. One type is tubular, with threads cut in the exterior surface. The insert is screwed into a threaded hole in the magnesium part. This insert may be used for bearings and bushings or may be threaded on the inside for attaching studs, bolts, etc.

Threads of the American Standard Thread series may be used, but special large pitch threads impart greater strength. The rounded profile of the Whitworth standard thread or similar thread series reduces the tendency for stress concentrations. The strength ratio of the inserts to bolts or studs should be such that the latter fail in torsion rather than by stripping the threads.

The second type of screwed-in insert is a precision shaped helical coil of spring wire used between the tapped hole and the mating bolts.

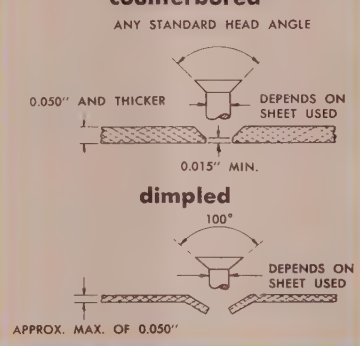
For best results, coil inserts should go in to a depth of 2½ times the diameter when heat treated steel bolts are used, and to 1½ times the diameter if mild steel bolts are used. For blind holes for screws or studs, inserts ½ times the diameter longer than the above suggested thread engagement should be used.

When tapping holes for these inserts, a finishing tap gives good results in one tapping operation.

Among the many quick release fasteners, self-clinching nuts have had considerable use in magnesium assemblies. These grooved, tapered nuts provide the full strength of standard nuts in less space and with less weight. Positive centering of hole and greater area of contact between fastened members and simple, low cost assembly are also important characteristics of these fasteners. These steel nuts are zinc plated and chromated for use in magnesium joints.

Nuts are inserted in hole and pressed into place with arbor press or vise. They should never be hammered. Pressure should be applied and maintained until the underside of the head of the nut is flush with the magnesium. Pressure should never be applied to the point where the head of the nut is imbedded into the magnesium as stress concentration would be set up at such a p

Fig. 2: Design Considerations For Riveting Magnesium



Locking bolts are pin and collar vices having good tension, shear fatigue strengths, as well as excel sealing qualities and high clinch. I ference fits are suggested and the cla ing action will pull together rigid tions having a total gap of 3/16 ¼-inch. High production rates are sible because of fast driving speeds the elimination of carefull fitting

The pin is factory lubricated for p er driving. This lubricant must be moved before painting as it may b through the finish paint. Locking b are commonly made of 6061-T6 alu num in 3/16, ¼, 5/16, ⅜-inch dia ters, with brazier, button, and 90° co tersunk types most in demand.

Protect Magnesium Joints

Assembly protection methods avoiding assembly stresses are import considerations in magnesium assemb

Assembly stresses above the stress rosion limits of magnesium are ea imposed on the components of a st ture unless care is used. Stress corros can occur in AZ31B-O and AZ31B-H sheet after 1500 days at 8000 to 10, psi. The magnesium-thorium sheet loys are not stress corrosion sensitiv

Assembly practices which ca stresses above these limits include ri ing or fastening sheet to a framew without preforming; or flattening o formed parts, joggles, and crimps.

Best practice in fastening sheet framework is to preform the sheet the frame contour before fasteni When fastening AZ31B sheet to fra work without preforming, a minim bend contour of 650 times the sh thickness is necessary. Fastening n stress corrosion-sensitive alloys with preforming does not cause such cracki

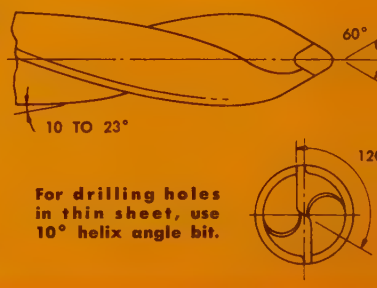
Magnesium surfaces in contact magnesium in contact with dissim metal surfaces provide a potential sou

(Continued on page

Table 2: Suggested Drill Sizes for Rivets

Nominal Rivet Size (inch)	Suggested Drill Size	Corresponding Hole Diameter (inch)
1/16	51	0.067
3/32	41	0.0960
1/8	30	0.1285
5/32	21	0.195
3/16	11	0.191
1/4	F	0.257
5/16	P	0.323
3/8	W	0.386

Fig. 3: Proper Bit Design For Drilling Magnesium



Difficult draws demand a personalized lubricant

The next time a part breaks at the press . . . scores, wrinkles, or won't clean properly in processing, call Kerns United. Your drawing compound may not fit your application. Kerns United approaches drawing problems in a unique way. Press, dies, stresses, metal and subsequent finishing operations are analyzed. Then a *personalized* compound is recommended or formulated that is compatible with all production requirements . . . one that provides results with a minimum of scrap loss and costly rejects. Rigid quality control standards assure you that your drawing compound will perform consistently from shipment to shipment.

Kerns United lubrication specialists have helped solve the most complex drawing problems . . . with a variety of metals. If you have a problem, call in the man from Kerns. For more information on Kerns United drawing compounds, call, wire, or write today.

PERSONALIZED LUBRICANTS FOR INDUSTRY

KERNS UNITED Corporation

828 State Street • Calumet City, Illinois

Subsidiary: Kerns Pacific Corporation, 630 N. Batavia St., Orange, California

4-piece assembly replaced by one aluminum extrusion

Hundreds of manufacturers have taken a fresh look at their products. In doing so, they have discovered that extrusions like the one shown can now cut down on hand labor and replace costlier assemblies . . . or replace rolled, crimped, welded or machined parts.

Production techniques and aluminum alloys have improved rapidly. So it takes a specialist—an experienced independent extruder—to keep you up to date with all the cost-saving possibilities that extrusions now offer. To be sure you're taking advantage of possible cost savings, have a nearby extrusion specialist analyze your product line promptly.

It's good business to know one of these independent extruders . . . specialists who are supplied with top-quality aluminum ingot by Aluminium Limited.

...and then there was one:

MAIL THIS COUPON FOR EXTRUDER NAMES AND ADDRESSES.

Aluminium Limited Sales, Inc., Dept. MM
111 W. 50th St., New York 20, N. Y.

Please send me a list of Independent Extruders in this area.

Name_____

Title_____

Company_____

Address_____

City_____ State_____

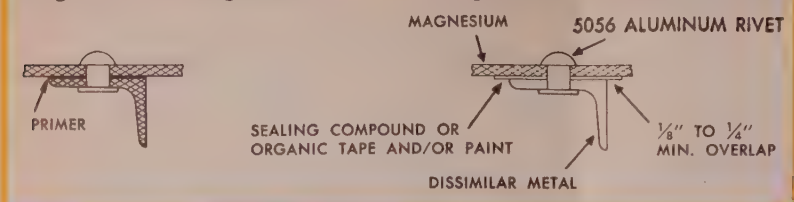
ALCAN Supplying metal and ideas to companies that work with alu

ALUMINIUM LIMITE

Aluminium Limited Sales Inc., 111 W. 50th St., New York 20, N. Y.

The rolled section in the top illustration is in four parts with several fasteners and two welds. It was replaced by the single aluminum extrusion below with great savings in time and labor.

Fig. 4: Proper Joint Design When Riveting . . .



of corrosion unless adequately protected. The most severe conditions of service include continuous exterior exposure and cases where magnesium may sometimes be wetted with chloride laden splash, etc.

For interior use where condensation is unlikely, no protection is necessary. Ordinary decorative paint coatings provide adequate protection against any unusual conditions.

Galvanic corrosion between the various magnesium alloys is negligible. However, good assembly practice dictates that magnesium faying surfaces be given one or more coats of a chromate pigmented primer. Fig. 4 shows the proper assembly of a magnesium-to-magnesium riveted joint and a riveted magnesium-to-dissimilar metal joint.

Protect It From Wood

Magnesium-to-wood contacts present an unusual problem because wood that is exposed to wetting holds the water in contact with magnesium for a long period and the natural acids of the wood tend to leach out and cause corrosion. To prevent moisture absorption, seal the wood with paint or varnish. Also treat the magnesium faying surface as for magnesium-to-magnesium contacts.

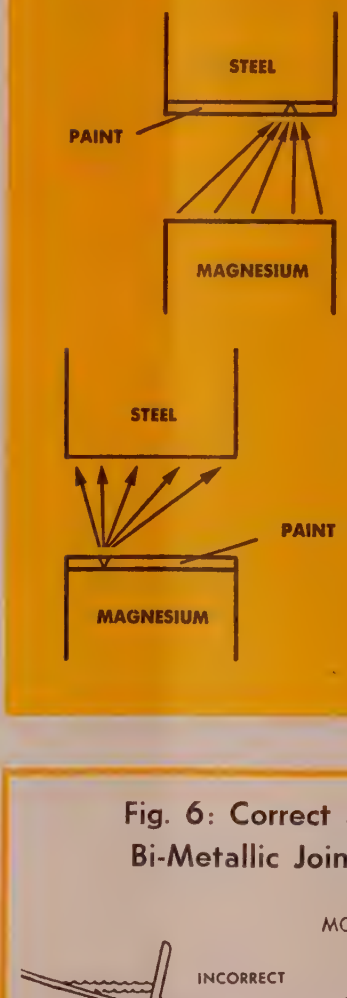
Galvanic attack between magnesium and dissimilar metals can be prevented by employing the following steps, alone or in combination:

1. Protect the dissimilar metal as well as the magnesium.
2. Use dissimilar metals that are compatible with magnesium.
3. Separate one from the other so the corroding medium cannot complete an electrical circuit.
4. Electroplate the magnesium.

Use moisture impervious alkali resistant films. In Fig. 5, the steel or aluminum is coated with a film and no galvanic corrosion occurs. When the film fails, as at a scratch, corrosion can start. When a large area of magnesium protects a very small area of steel, the magnesium corrosion is superficial (as shown in top diagram).

As long as a perfect film remains on the magnesium no corrosion occurs. When the film breaks, and a small

Fig. 5: Corrosion Factors To Consider When Joining Mag to Other Metals



area of magnesium is coupled to a la
area of steel, severe pitting occurs
the magnesium (bottom diagram). Th
alkaline resistant paint should be
plied to both the dissimilar metal a
magnesium.

Aluminum alloys 5052, 6053, 50
6061 and 6063 are compatible with m
nesium and should be used as washe
shims, fasteners and structural membe
Tin, cadmium or zinc plated steel a
tin, cadmium or zinc plated brass do
prevent galvanic corrosion under
worst conditions, but are satisfactory
some milder environments.

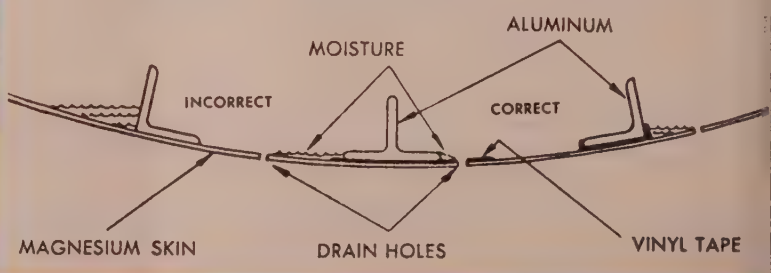
Tin is the most effective plati
Stainless steels, titanium, aluminum
loys 2024 and 2024 Alclad, 7075 a
7075 Alclad and 3003, copper, Mon
etc. corrode magnesium when coupl
to it under corrosive conditions, so
protective schemes shown here shou
be used.

Proper design may also utilize n
absorbent tapes or sealing compoun
in joints. Use vinyl tapes as thin
0.003-inch or other non-absorbent ta
such as organic rubber. (Do *not* use
cloth supported type; cloth acts as
wick.) Sealing materials in high
stressed joints must remain non-c
ductive in use and must extend out fr
the joint sufficiently to prevent bridgi
by the electrolyte.

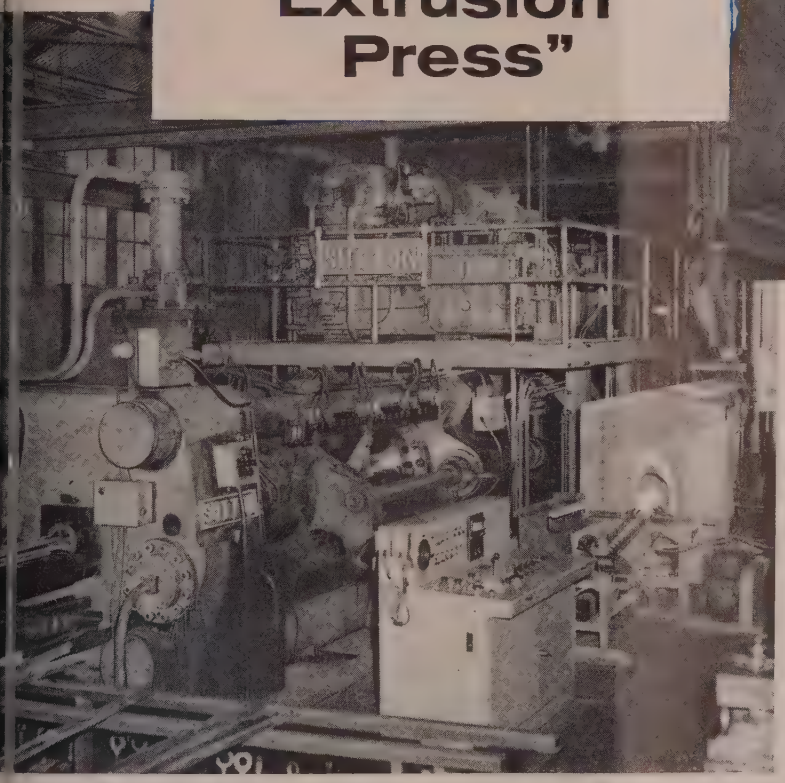
Fig. 6 shows a structure in which s
water was allowed to collect. The sh
on the left will corrode where it is
contact with the aluminum angle. T
center angle has a tape separator in t
joint. On the left side it does not
tend far enough, but on the right t
tape extends far enough so that a dra
hole can be drilled through it. Or t
tape can be wrapped up the sides of t
extrusions as demonstrated at extre

A fourth way of reducing galvanic c
rosion is to electroplate the magnesiu
A copper-nickel-chromium system eli
inates the potential difference betwe
magnesium and the dissimilar met
This method is especially applicable
small parts.

Fig. 6: Correct and Incorrect Design of Bi-Metallic Joint Exposed to Moisture



"5000 lbs. per hour with our new fully-automatic SUTTON Extrusion Press"



So says Charles D. Fetter (seated) shown with Paul L. Fetter co-owners of Greater Louisville Industries and Fetter Bros. Aluminum Mfg. Corp. of Jeffersonville, Indiana.

Their new "Sutton" is a 1650 ton horizontal extrusion press for high-speed production of extruded aluminum solid and hollow shapes. Designed for fully automatic operation, an auxiliary control panel mounted on the front platen makes possible operator control of extrusion speed and all press functions while closely observing the work as it emerges.

Yes, if its a "Sutton", customer satisfaction starts with fast start-up after installation, includes quality construction and design features and is emphasized by the high production records all Sutton equipment helps make possible.

Typically, Fetter points out: "We are well pleased with our Sutton installation. Dead cycle time is extremely quick. We like the 6" x 30" billet and the optional containers making it possible to extrude 7" or 8" diameter billets. We appreciate the rigid construction and fully automatic operation. The press was in operation within a week after delivery and we have extruded up to 5000 lbs. per hour which we feel is extremely good."

Ask for data at no obligation

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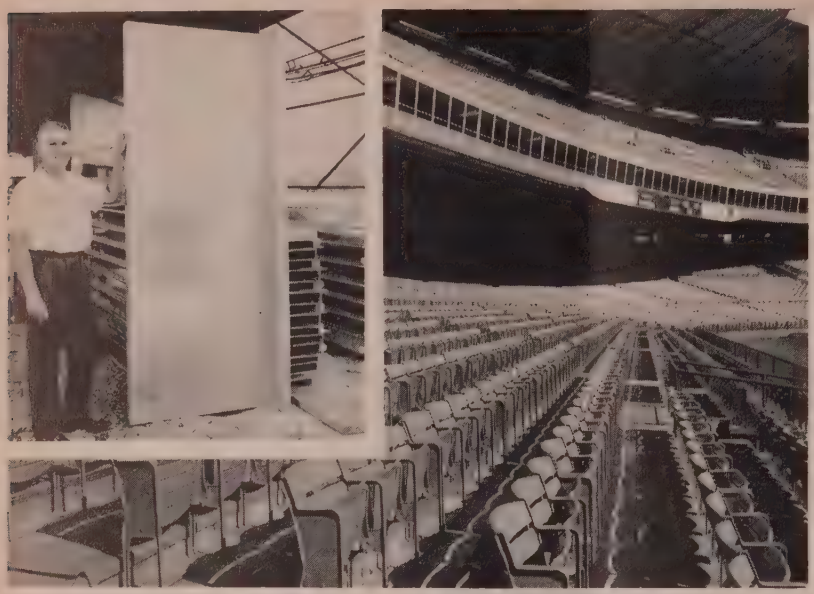
Manufacturers of Hydraulic Extrusion Presses • Straighteners • Centerless Bar Turners • Rotary Swagers • Sheet Levelers • and other Processing Machines for Modern Metals

News Products and People



How Aluminum Serves New 'All-Sport' Stadium

Unique design for Washington, D. C.'s new sports stadium makes use of aluminum in a large section of portable stands. Constructed for the Washington, D.C. Armory Board, the $24,000,000 stadium is designed for quick conversion from the normal football horseshoe to the traditional baseball diamond right angle for maximum visibility and utilization.

The design provides a rotating aluminum and steel section which forms the U of a horseshoe for football. For other events, the aluminum U sections collapse and a movable side line stand slides out on rails to form a right angle with a stationary stand.

Seating 50,000 for football and 43,000 for baseball, the stadium will be used by the Washington Senators, the Washington Redskins and the George Washington University Colonials. It will also provide facilities for major events such as circuses, music and folk festivals, civic and national affairs and other functions.

The convertible section of the stadium was fabricated by Reeves Steel, Inc., of Tampa, Fla., using aluminum plate supplied by Fullerton Metals Co., Chicago, a Kaiser Aluminum distributor.

The plate, alloy 5005 H-14 in .220 gauge, forms decking which rests on collapsible steel frames. The entire unit is designed for easy handling and rapid erection and dismantling. When erected, removable theater-type folding chairs are placed on the decking and bolted in place. A special mastic applied to the plate provides safe footing in wet weather.

Located near the heart of Washington, the stadium grounds cover a total of 10 acres, with the stadium itself occupying 6-½acres. By utilizing the convertible and rotating stand principle, 80% of the total seats are adjacent to the foul lines for baseball, and 50% adjacent to the side lines for football.

Reynolds Makes New Bid For Can-Making Business

Reynolds Metals Co. will purchase, use and lease to can makers high speed machinery which provides the most important step toward producing welded aluminum cans at speeds triple that of conventional canmaking equipment.

The machine, developed by New Rochelle Thermatool Corp., New Rochelle, N. Y., forms tubular can stock from long coils of aluminum and produces a strong side seam through use of a high frequency electronic welding principle. Reynolds has installed the first machine at one of its packaging research facilities where further development work on the project is underway.

The new concept would permit for the first time production of three-piece aluminum cans with a side seam sufficiently strong to withstand the internal pressure exerted in packing heat processed food products. Reynolds reports that the New Rochelle equipment can form coils of aluminum into tubular shape at speeds several times greater than other types of can making machinery, including that used to solder the side seams of tinplated steel cans.

New Sheet Mill Has High-Efficiency Coolant System

An aluminum bar and sheet reversi mill, being built in the U. S. for shi ment to the South American subsidia of a Canadian firm, will be equipp with a Dravo-DeLaval continuous c culating mineral oil coolant system.

Dravo Corp., Pittsburgh, is supplyi the system to E. W. Bliss Co., Sale Ohio, for installation on a cold m that will be shipped to the Colomb plant of Alcan de Colombia, a subsi ary of Aluminium Ltd.

An important feature of the syste will be an automatic DeLaval diat maceous/Fuller's earth filter, design to eliminate from the coolant all co tamination particles down to ½ micr in size. Because of its unusual efficienc the filter has major significance for t aluminum industry where increasing exacting specificatiins for sheet and fo require that the strip being rolled free of stains or impurities.

Coolant for the system will be stor in a 5000-gallon reservoir. Temperatu and operating pressure will be co trolled automatically.

Tiny Machined Case Has Important Defense Role

Machined aluminum case is one o number of new wrinkles thought up engineers of Daystrom, Inc., Archba Pa., in designing the new Squaretr line of precision subminiature trimm potentiometers.

In addition to extra strength, t aluminum casing gives the adjusta ½-inch square potentiometer hi power dissipation ratings over extrem wide temperature ranges. The hi density pill-size package also ada itself easily to a variety of stacked a printed circuit mounting configuratio The tiny components are used in delicate matching, balancing, and justing of missile, computer, telemet ing, control, and other types of criti electronic circuits.

COMBINING IDEAS WITH ALUMINUM

A Series of Ads For Manufacturers With Ideas

When Roamer Division of Chris Craft decided to build an all new 27-foot express cruiser, the idea was to mass-produce a minimum maintenance boat for sale at a popular price.

And when Kaiser Aluminum developed marine alloy 5086, the idea was to achieve high tensile strength, easy weldability and exceptional resistance to saltwater corrosion.

Working with Kaiser Aluminum all the way, Roamer created the most exciting boating breakthrough in years—the 27-foot "Silver Comet", a profit producing example of a customer need met through combining ideas with Kaiser Aluminum.

For ideas to match your ideas, look first to Kaiser Aluminum.

KAISER ALUMINUM

See "Follow The Sun" and "Maverick" weekly, ABC-TV Network

Kaiser Aluminum & Chemical Corporation, Kaiser Center, 300 Lakeside Drive, Oakland 12, California

THE 27-FOOT "SILVER COMET" with all-welded hull of Kaiser Aluminum. Built by Roamer Yachts Division of Chris Craft Corp.

EXTRUSIONS

that conform in every way

TRU TO SPECIFICATIONS
TRU TO UNIFORMITY
TRU TO DELIVERY DATES

EXTRUDING

High speed fully automatic multiple press operation with automatic transfer equipment able to extrude and handle complicated shapes up to seven inches wide.

ANODIZING

Twenty-two foot tanks for clear and color anodizing. Buffing, polishing and chemical brightening also available.

PACKING

All standard types of packing plus cocooning, sleeving and interleaving. Custom packaging to meet your requirements.

TRUCKING

Adequate fleet of late model trucks assures dependable delivery. All drivers and handlers experienced in loading and transporting delicate cargo.

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Sales Engineers fully trained in extrusion technology to answer your questions on the welding, machining, forming etc. of aluminum extrusions.

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JEFFERSONVILLE • INDIANA
3 MIN. FROM DOWNTOWN LOUISVILLE

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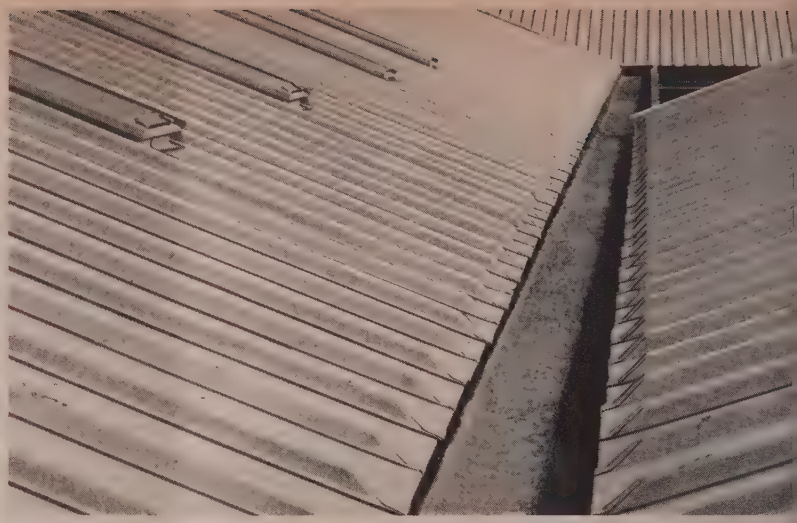
PHONE 332-0336



'Sealed-End' Effect Given To British Roof Sheet

A building sheet product of Alcan Industries Ltd. Banbury, Oxfordshire, England, features a durable painted finish in a variety of colors, and a 'sealed-end' effect that improves appearance and weathertightness.

The attractive painted finish, which will shortly be available, is a tough, baked-on vinyl coating which is permanent in color and, due to a special anodic surface pre-treatment (developed within the Alcan group of companies), will neither crack nor peel.

"As an alternative to natural, Alocromed or Pyluminized finish, this painted surface may well make its greatest appeal to architects on Noral Snaprib sheet which is now widely used on all types of buildings, both in Britain and overseas," Alcan Industries reports.

It is on Snaprib, also, that the sealed-end effect is expected to find favor with architects. Sealed-end Snaprib, in which the ends of the sheet are folded to for an integral eaves or ridge filler, or bot offers complete weathertightness at ve shallow pitches; moreover, it preven even greater rigidity against wind loa Comparable advantages are offered Sealed-end Industrial sheet.

A newly developed sheet, Noral Wid Pitch Industrial, is shown for the fi time, as is curved Noral Deep Trou Industrial, a 20-foot length of which incorporated to represent its use f barrel-vault roofing. A recent applic tion of this (see photo) is the 4-acre ro of the service reservoir for the Fyl Water Board at Weeton, Lancashire.

The variety of Noral extruded s tions made for the building industry f both structural and decorative purpos includes two panels of interlockin fascia sections and a 16-foot length handrailing incorporating strip-lightin in the top rail.

Alumina-Bearing Ore Goes To Work for Coal Firm

North American Coal Corp., a leading producer of bituminous coal, is poised to begin production of alum or aluminum sulfate, used by the paper and pulp industry in water-proofing and by municpal and industrial water treatment facilities to aid in water purification.

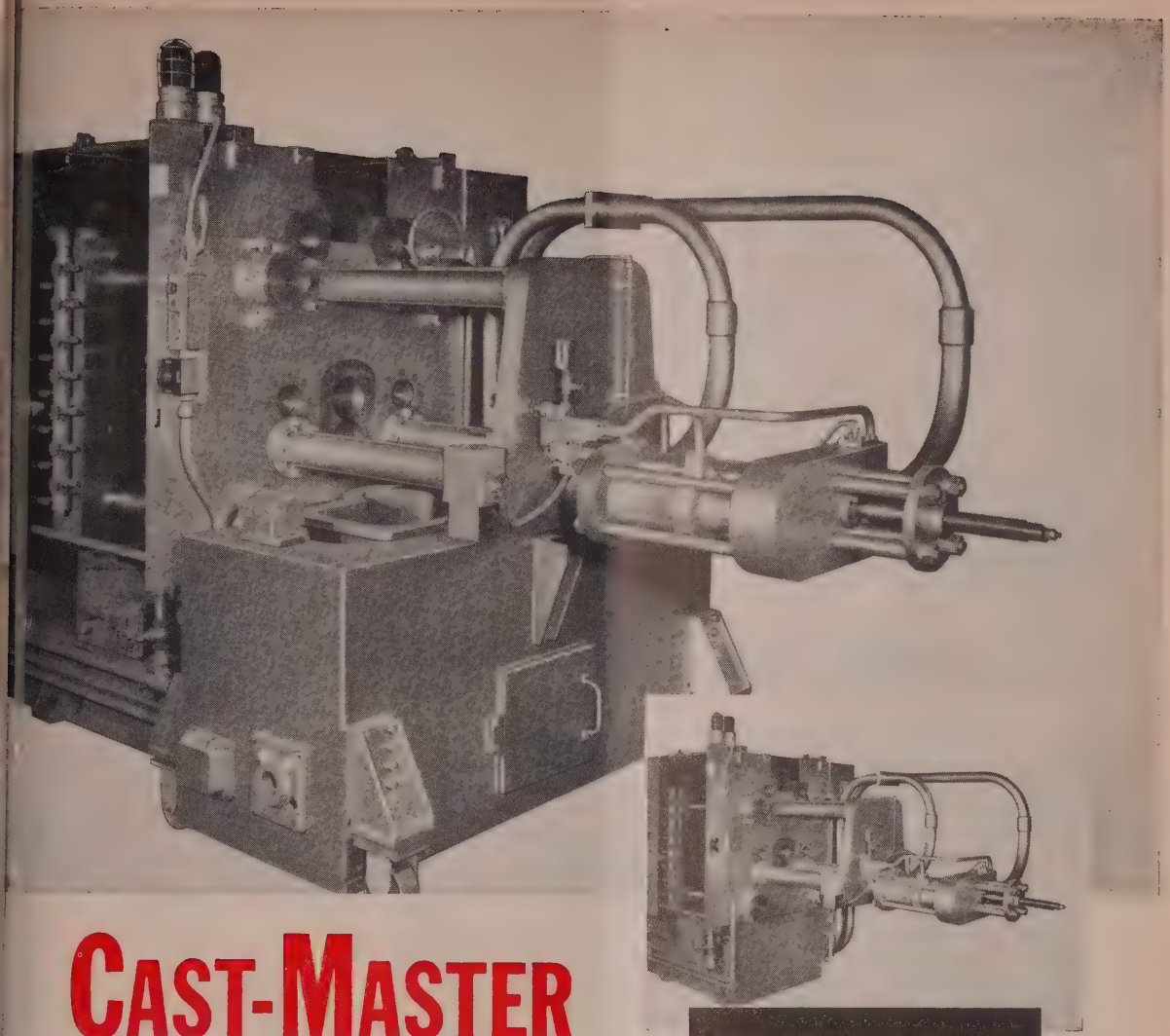
North American broke ground for the $2 million alum-producing facility last March at Powhatan Point, Ohio, some 20 miles downstream from Wheeling, W. V.

North American's hopes for a brighter future are sustained by an exclusive new process which the company will use to produce the alum. The process was developed in cooperation with Strategic Materials Corp. of Niagara Falls.

Key to the method is use of ore which North American for years discarded as waste in its coal mining operations. The ore lies in a band abo the coal seam and must be removed get at the black fuel. In it is contain alumina, or aluminum oxide, the r material for making aluminum met Some ten million tons of the now-i portant alumina-bearing ore is prese ly above ground on sites adjoining t new plant, and many more millions tons are in the ground.

North American's new process w make a plentiful new domestic sou of alumina available to users throu out the country. Heretofore, bauxite H been the lone source of commerc alumina in this country, and 85% the bauxite consumed domestica comes from foreign deposits.

Alum from its alumina-bearing c will be in purer form than that possib from conventional processes which st with bauxite or clays.



CAST-MASTER

builds what the die caster needs

Compact efficiency made possible with redesigned injection end is illustrated. Injection and intensifier cylinders are side by side; high pressure piping is shown to rear of cylinders. Furnace rolls under injection assembly—out of the way and close to work station.

New convenience, new efficiency is illustrated in view with furnace removed. Cast-Master builds what the customer wants!

Backed by a program that is "customer-controlled", Cast-Master consistently strives to improve its machines. The latest in a long list of modifications, through the years, are illustrated. They include:

- **New 4-strain rod design provides better, *more accurate plunger alignment.***
- **High pressure lines relocated—permit furnace to be used under injection cylinder (see small photo). *Removes hydraulic lines from furnace heat.* (Special piping arrangements upon request.)**
- **Simplified hydraulic circuit features subplate mounted valves, *less pipe and tubing.***
- **Cast-Master shot intensifier system operates without valves. Instant intensification of injection pressure *improves casting quality—gives smoother finishes, decreases porosity.***
- **Slow shot principle delays high speed injection plunger till after plunger passes metal pouring opening. (Eliminates splash.)**
- **Injection assembly is infinitely adjustable from minimum to maximum injection speed.**

H-P-M DIVISION — KOEHRING COMPANY

H116

CAST-MASTER

MOUNT GILEAD, OHIO, U.S.A.

Fence Kit Designed For Pool, Patio Privacy

A new aluminum fence panel system for backyard, pool and patio enclosures can be easily installed from kits being introduced by NGE Rolling Mills, Box 2297-D, Pasadena, Calif. The complete fencing system of aluminum slats, posts, including gates if required, with instructions for erection is provided in the NGE kits. Several colors of lasting baked enamel are available. These permit the owner to periodically change sections for variations of the color scheme, and the slats can be varied by basketweave, vertical and horizontal in-

sertions. Kits can also be solid color

Slats are 10-inches wide and height in multiples of this width be obtained. The fencing system als available for commercial installatio

Acrylic Enamel Cured Fas With 'Far' Infrared Rays

Thermosetting acrylic enamels veloped by the Springdale Resea Center of Pittsburgh Plate Glass can now be cured in 24 seconds, c pared with a 30-minute requirem using conventional baking equipm

In this new development PPG's D acron coatings are cured rapidly by posure to "far" infrared radiation, more efficient waves of infrared s trum. These organic coatings can cept intense radiation without sacri to their properties of hardness and f ibility and its good weathering qualit the Research Center indicated.

Several equipment types have m possible the direct conversion of gase fuel to "far" infrared energy. One s cific type has been used at the P Research Center which catalytically c trols the radiant emission of infra wave lengths.

This equipment mixes gas and diffuses the mixture through a heat sisting medium in a panel burner a burns it on a catalytic gauze surfa The latter becomes the temperature ergy source of infrared without the p ence of a flame.

Emission source temperatures can controlled between limits of 800° 1500° F. A Duracron coating can rapidly cured at the surface exposed the infrared waves. It is not necess to bring the mass of the coated obj to the proper metal temperature effect a cure of the film.

Under normal conditions the enar would have to be cured for 30 minu at 350° F. in an enclosed gas fired c vection oven. In continuous producti of metal strip, the Duracron enar would have to receive 60 to 70 seco exposure to 650° F. hot air wh metal temperatures rise to 400° F. ir 100 foot convection oven with a l speed of 100 feet per minute. If same line speed was maintained a ca lytic combustion infrared oven wo have to be only 40 feet long in or to obtain 24 seconds exposure wh has been determined satisfactory for Duracron enamel.

Reduced space requirements or fas line production can be accomplis with this type equipment. The h equipment described also allows for l capital investment, low fuel cost a low energy loss, simplicity of operat and design.

End products of this production typified by metal sidings, metal w partitions, curtain walls, can coatir

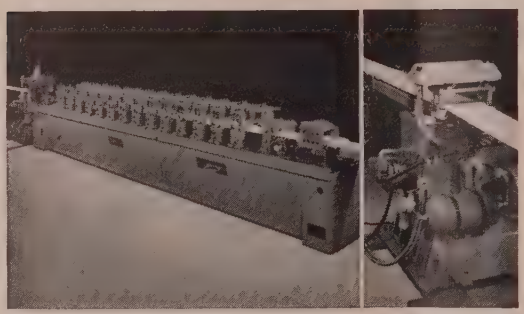
AMERICAN ROLLER DIE CORP. ARDCOR

PRODUCTION EQUIPMENT

produces MILLIONS of SQUARES

of

ALUMINUM SIDING



ARDCOR typical production line includes Coil Reel, Prenotch Press, Leveller and Roll Forming Machine—with Rotary Punching Unit for piercing nail and weep holes or slots, Cut-off Press and Runout Table.

Ardcor invites your inquiries for complete cold rolled forming lines — from coil to finished product — for all shapes. Many Ardcor high production lines are in use today — some manufacturers using over 15 complete lines.

What are your requirements? Write, or phone us, today!

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AMERICAN ROLLER DIE CORP. ARDCOR

Single Roll Forming Machines • Complete Automated Roll Forming Production Lines • Lock Seam and Electric Weld Tube Mills for Ferrous and Non-Ferrous Metals • Cut-Off, Pre-Notch Presses • Slitters • Straightening, Pinch, Leveller Rolls • Pipe Rolls, Tube Rolls, Forming Rolls

Bonderite from treating unit of strip aluminum finishing line is passed through cation exchange resin bed of Parker Reactifier. Purified Bonderite returns to coating bath, free of impurities.

How to keep your conversion coating bath for aluminum going forever!

When you have Bonderite and a Parker Reactifier in the line, you never have to dump the coating solution that treats strip aluminum in your plant. But you may want to buy the solution a birthday cake on every anniversary!

The conventional chemical solution for coating aluminum deteriorates in use to the point where it produces low quality coatings and must be discarded. This deterioration is caused by the build-up of impurities which throw the bath permanently out of balance, and by unmanageable sludge formation.

The Parker Reactifier keeps Bonderite for strip aluminum lines going at top efficiency indefinitely by ending both these threats. As impurities are formed by reaction of aluminum going through the solution, they are removed by ion exchange in the Reactifier. Efficiency of the solution and quality of the coating is constantly maintained. No sludge forms, ever! No plugged nozzles, no down-time.

You get money-saving, visible-quality coatings from a Bonderite solution that stays clean and effective day after day and year after year.

GET MORE INFORMATION NOW

Send for free booklet, "Constant Purification by Ion Exchange." Tells how Parker Reactifier and Parker Bonderite combine for economy and constant high quality in aluminum treatments. PARKER RUST PROOF COMPANY, 2198 East Milwaukee, Detroit 11.

PARKER

FIRST IN SURFACE TREATMENTS FOR METALS SINCE 1914

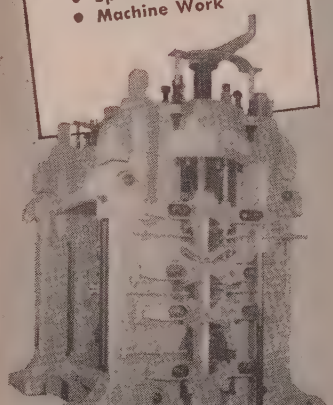
RED CIRCLE Rolls ALLOY-CHILLED

Hyde Park

Rolling Mill Equipment

For more than 50 years Hyde Park Steel Mill equipment has been helping American industry lead the world — equipment such as—

- Bar Mills
- Merchant Mills
- Sheet and Strip Mills
- Pinion Stands
- Roller Tables
- Reduction Drives
- Stretcher Levellers
- Guillotine Shears
- Sheet Mill Shears
- Roll Lathes
- Special Machinery
- Machine Work



For finer finish, long life and greater tonnage, specify Red Circle Rolls.

Hyde Park

FOUNDRY & MACHINE CO.

Hyde Park, Westmoreland Co., Pa.

ROLLS

ROLLING MILL MACHINERY

GRAY IRON CASTINGS

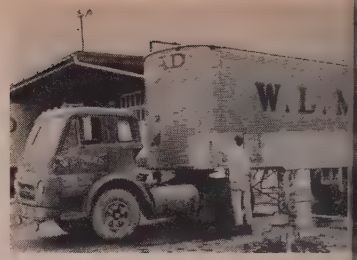
Electrical Field Using More Aluminum

The field of electrical applications took a substantially larger portion of aluminum in the second quarter of 1961 than in the first, according to end-use statistics released by The Aluminum Association. Second quarter shipments of semi-fabricated aluminum products to the electrical field accounted for 11.4% of the total, a rise of 2.8 points over the first quarter.

The electrical classification covers such uses as power transmission and distribution equipment, machinery and equipment, rigid conduit, communications equipment, and capacitors and condensors.

This increase brought electrical uses of aluminum into third rank, edging out the containers and packaging category which now stands in fourth place with a 10.1% portion of shipments for the second quarter.

Major user of aluminum is reported by the Association's 47 member companies continues to be the building products field with 23.8% of second quarter shipments.



Cleaner Developed For Trucks, Trailers

A new aluminum cleaner, devel for use on aluminum and stainless trucks and trailers, is being introc nationally by the Sherwin-William Cleveland, Ohio. The product, named "AC 266 Aluminum Clea is an acid-type formulation that rer heavy oxidation, corrosion, diesel road film and dirt.

The material is reduced with in a ratio of up to one part clean 10 parts water immediately prio use. Built-in sudsing action hold material against the surface, preve rapid run-off so the chemicals ca their work. Properly reduced, the er does not affect signs or decals.

Impressive Advantages Claimed for New Solder

A special aluminum solder, Ed-Cor, has been announced by Scientific Products, Inc., 521 Marylyn Ave., State College, Pa. Even though aluminum solder as such is still relatively new and somewhat unique, what sets Ed-Cor apart from other aluminum solders, according to the manufacturer, is that it resists corrosion "to an unmatched degree," is non-toxic, and requires no pre-cleaning. Moreover, it was especially designed for unusually effective joint strength.

One key to this advanced aluminum solder is the patented flux core. The standard grade of Ed-Cor is high strength zinc base solder with a higher melting point than soft solders commonly used in sheet metal work. Yet with a melting point of 780°, Ed-Cor is enough under that of aluminum to avoid danger of melting the work.

Ed-Cor aluminum solder can be used to join commercially pure or low alloy aluminum to itself or to stainless steels. An important feature of Ed-Cor is that the standard grade fillet solder is designed to flow easily but without running through the joint or along the surface of the aluminum.

"Aluminum solder, of course, opens the door to many manufacturing, fabricating and maintenance procedures heretofore believed impractical or even impossible," the manufacturer said. "In fact, potential applications are almost limitless. For instance, joining aluminum transmission cables to fixtures; joining and repairing aluminum castings; many varieties of joining o tions in the aircraft and missile making joints in aluminum win doors, grilles, ladders; fabricating processing equipment; joining dair cream and restaurant equipment.

"Both electrical and electronic e ment can use aluminum solder effectively. Also, there are a gr number of uses in the automotive and most certainly in the alum pleasure boat industry . . . to list a few possibilities."

Scientific Products, Inc. stresse fact that this is a special aluminu der, not one of the all-purpose type being offered for joining many diff metals. The fact that Ed-Cor ca applied, in most cases, without cleaning around the intended jo an added valuable cost and time s feature. Only where the metal i usually grimy or where it is cover rosin or paint should it be pre-cle

SPI's laboratory emphasizes th portance of providing a suitable a fective heat source when joining a made of aluminum, "otherwise even attempt to use aluminum so The company points out that alum draws heat away from the joints rapidly. Therefore, large work re an oxyacetylene flame, interm work at least a propane torch, anc small work such as wire or ele components a soldering iron. Any approach is apt to lead to poor Aluminum requires this slight extra

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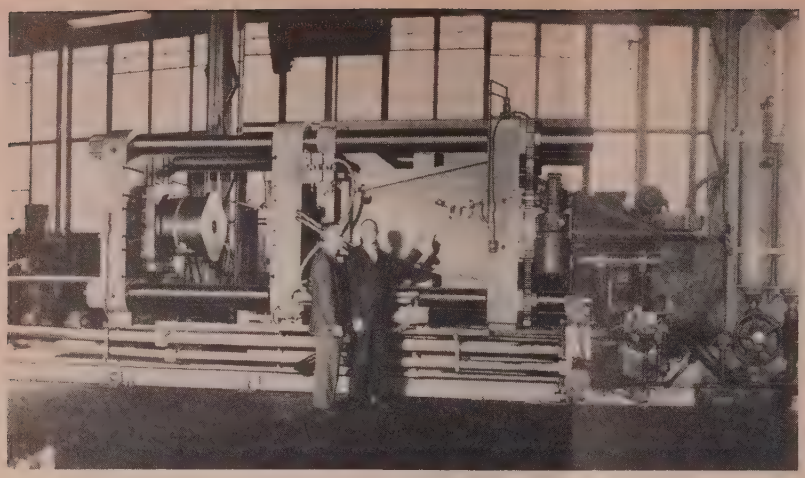

Giant Die Casting Machine Has New Features

A new die casting machine having a die locking force of 1300 tons has been built by Kux Machine Co., 6725 N. Ridge Ave., Chicago. James J. Kux, president of the firm, is shown above, pointing out a few features to his chief engineer, Roland Jacobson. The equipment tested to 1600 tons under the standard strain gauge test approved by the Society of Die Casting Engineers.

Many features are incorporated into the machine—self contained maintenance-free hydraulic system, motorized push-button die height mechanism and automatic lubrication. Other features are Vac-U-Die system of vacuum die casting, heavy duty one-piece supporting base, massive toggle linkage unit, hydraulic ejection and core pull mechanism, push button electrical controls, extra heavy solid steel die platens, aluminum bronze bearings, and alloy steel toggle pins and tie bars.

Weight of Model HP 1300 is in excess of 150,000 lbs; die platens are approximately 5½ by 7 feet and have nearly 5 feet of die space clear between tie bars. The completely ed high pressure hydraulic system i porates a 50 H.P. motor and gene the power to cast 60 lbs of molten minum per machine cycle under i tion pressure into the die of 1 P.S.I. and with a velocity of 150 i per second.

The HP 1300 can go through complete cycle of full stroke of die ens and injection in 11 seconds. Ha a die separation stroke of 32 in this machine will accommodate a nearly 7½ feet long by 5 feet wid 5 feet thick.

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LANCASTER, PENNSYLVANIA

Standard Covered Hoppe Cars Built in Aluminum

The first of 40 new aluminum cov hopper cars have been delivered to Louisville & Nashville Railroad. L & N's initial use of lightweight ro stock.

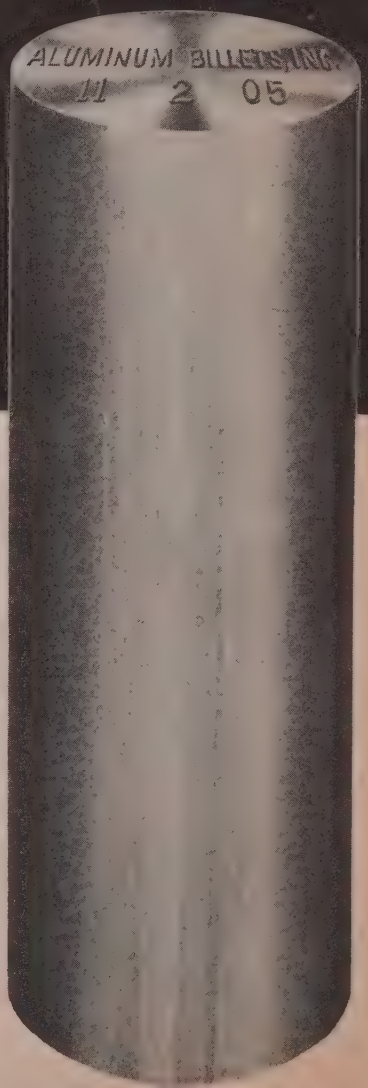
The cars are being produced at man-Standard's Bessemer, Ala. sh utilizing aluminum plate, extrus and castings supplied by Aluminum of America. Based on the standard covered hopper design, the alumi units have a light weight of 5 pounds—a saving of close to 1 pounds compared with an all-steel c similar design.

According to L & N, the new ro stock will be assigned to hauling mina and other bulk commodities. alumina (aluminum oxide, from w metallic aluminum is extracted) is ed hot, aluminum alloy 5454 was ch for all plate and extruded parts. high-strength, weldable alloy was sp ly developed by Alcoa for elevated perature service. Approximately 1 pounds of aluminum are utilized in car for all parts which will be in co with the lading.

The PS-2 aluminum cars are desi for a capacity of 3506 cubic feet, an equipped with 90-ton trucks. They ure approximately 51 feet over str 10-½ feet wide, and 13-1/3 feet hig

at competitive prices...

Drawn from a photograph in the files of the New Jersey Aluminum Company, New Brunswick, New Jersey. This company likes our billets and is impressed with our quick, on-time deliveries.



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The secret of magic quality comes from using the best analytical equip-ıt, including the Baird-Atomic Spectromet for properties control. Modern, ıplete homogenizing facilities give molecular uniformity to grain structure. :h billet has a control number to identify the alloy . . . whether you need rusion speed, tough product finish, and/or long die life.

Company-owned trucks operating from plants in Youngstown, Ohio, and ıth Amboy, New Jersey, make possible deliveries to meet your production uirements. A challenging service that saves the customer time and money.

What's more, Aluminum Billets, Inc., one of America's oldest independent ppliers of aluminum billets, is customer conscious . . . specializing in con-sion . . . and staying competitive in today's market. Want more information? ite or call today.

ALUMINUM BILLETS, INC.

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New Strip Joiner Eliminates Accumulator

A strip joiner that makes strong mechanical joints in strip stock automatically, without stopping the line, is now available from the Metal Processing Department of Pennsalt Chemicals Corp., 3 Penn Center, Philadelphia. It can be used in continuous production lines for tinning, anodizing, painting, plating and annealing, the company said.

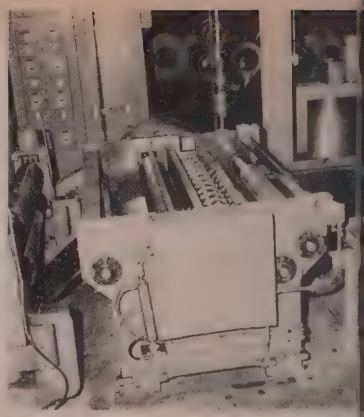
The machine uses a series of rotary punches and dies to join strips with numerous ½-inch tabs; the tabs are pierced through both strips and are then folded back and calendered flat.

Strip processors will realize big savings using the new strip joiner, both from the significantly lower initial investment required and from the superior performance of the joining operation. Since the joiner operates "on-the-fly," no entry accumulator or loop pit is required. What's more, it out-performs welding operations—either manual or automatic dual seam— at lower cost and using less floor space.

The new Pennsalt joiner is quite flexible, too. It joins dissimilar metals readily, handling gauges from .010 to .050 inch. It can be designed to ha heavier gauges and joint strength be increased by setting the die rolls more than one revolution, the lengthening the joint.

In addition, the new strip joiner quires little maintenance, and s strip by utilizing uneven or torn s ends, eliminating crop shear at e and saving on coil end scrap.

This new joiner is Pennsalt's la effort to provide strip processors a c plete "package" of equipment and ch icals for a variety of metal proces jobs. Pennsalt also makes equipm for brush washing strip and provi cleaners, etchants, tin plating c pounds, continuous phosphate coat and Hinac—the firm's new chron coating process.



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Write for Complete Details

Dow To Increase Magnesium Production

The Dow Chemical Co. is rehabil ing a portion of its Texas Divi Plant B magnesium production facili which have been closed since early 1 Earle B. Barnes, Texas Division gen manager, announced plans to put of the eight Plant B magnesium ele lytic cell buildings back into produc on January 2.

"We are producing magnesium at capacity at our five cell building Plant A, and have been for some ti he said. "We are selling magnesiu a higher rate than it is being produ with the difference being made up f inventory stocks. Now the inventor approaching a good working level, we will need to bring on some addi al capacity."

Clyde H. Boyd, the division's ma sium production manager, said about 150 new employees would needed by the Magnesium Departm plus some more by service departm

The Dow magnesium process use water as its starting material. This i acted with lime to precipitate a ma sium compound which, after va other types of treatment, is electrol into magnesium metal in the cell b ings.

w Window Has Weather Control Features

ew all-aluminum combination win- as been introduced by Humphrey cts, Inc., 719 E. Zimmerly, Wichi- n. incorporating all of the unique ed features of their present All er Insulating Windows, plus the eature of a built-in sun control , combined in one compact nical unit, the company reports. nphrey Products' engineers de- their new window series to pro- ome owners as well as commercial stitutional buildings with a built- aintenance-free, year around sun tion, which has proven to bal- eat and air conditioning loads by ating hot spots.

all-aluminum window incorpor- Kaiser Aluminum ShadeScreen sealed between two panels of glass and pressure fitted into Humphrey's "Tension Sealed" 1¼-inch-wide glass channel frame of .040-inch formed aluminum sheet. In this manner the aluminum screen is protected by the glass panels and provides a permanent solar heat block that prevents interior fading of furnishings and reduces room temperature by as much as 15 percent. Kaiser Aluminum ShadeScreen is made up of miniature louvers that allow for soft diffused light to enter with adequate inside or outside visual quality.

A complete line of this new window will be available in all standard double-hung and horizontal sliding windows in self-storing combinations, fixed panels and in standard door sizes.

---

roved Reduction Cell May Cut Aluminum Cost

e British Aluminium Co., Ltd., Kaiser Aluminum & Chemical have announced the successful development of a modified type of num reduction cell utilizing re- ry hard metals as essential ele- .

ls with these new cathode ma- s offer the first basic alteration to lectrolytic reduction process on the world's aluminum industry een based since it was invented 75 ago.

e two companies consider the de- ment to be of major commercial icance, according to the joint an- cement by Lord Plowden, chairman British Aluminium, and D. A. des, president of Kaiser Aluminum, se it can substantially reduce pro- on cost per pound of aluminum also permit expansion of the ca- y of existing facilities with relative- all capital expenditure.

e development can lead to an im- ement of up to 15% in cell opera- they said. This can be achieved r by a decrease in the energy con- tion per pound of metal, or by an ase in metal output per pot.

Both British Aluminium and Kaiser Aluminum are currently using the development in certain of their reduction facilities. They plan to continue making refinements in its application to existing cells in order to insure further the successful adaptation of the development to all types of reduction cells.

The development was invented by research experts of BA in the early 1950's. Kaiser Aluminum joined with British Aluminium in the mid-1950's in a joint research program designed to carry forward the further development of the basic inventions.

Since that time the two companies have cooperated in the development of the refractory hard metal materials and their application to both existing and new electrolytic reduction cells. The companies also have obtained basic patent protection in the principal aluminum producing countries of the world.

Refractory hard metals are chemical compounds of exceptionally high hardness and melting point which otherwise resemble dense, heat-resisting metal alloys. Typical refractory hard metals are the carbides and borides of titanium and zirconium.

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For more than 40 years, Magnus Chemical Company has maintained its leadership in the cleaning field by offering this unique time-and-cost-cutting combination:

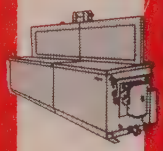
CLEANING CHEMICALS

Over 300

Magnus produces a complete line of specialized chemicals — formulated to work independently or solving your cleaning problems in perfect combination with

CLEANING EQUIPMENT

Over 100 Types



Magnus also manufactures more than 100 types of automatic and semi-automatic cleaning machines, each designed specifically to work with Magnus chemicals to produce better cleaning results at lower cost.

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Please send FREE information on Magnus time-and-cost-cutting cleaning methods.

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Folding Escape Ladder Looks Like a Drain Pipe

Fire escapes can't be an eye-sore when they are hidden, and Win-Chek Industries, Moonachie, N. J., has designed a fire escape that looks like a drain pipe. Winchek makes them for two and three story structures, such as schools, apartments, motels, hospitals, and office buildings—as well as for private homes.

"Safe-X-Scape," can be mounted outside any upstairs window on any building. A child can operate it and climb down to safety in ten seconds, Win-Chek reports. A catch is released, causing the "drainpipe" to fold out into a full sized sturdy aluminum ladder which will support 2,000 pounds.

For security, the Fire Department ladder cannot be opened from the ground; only from the second or third story window. When closed it's just another aluminum drainpipe in appearance; needs no painting, lubrication or maintenance.

The standard 16-foot ladder for two-story structures will retail for approximately $60 plus installation costs. The three-story ladder will cost about $68 plus installation. Total cost is less than for conventional fire escapes for small structures, the manufacturer says.

Reynolds Sales Company is distributing the concealed fire escapes through hardware and variety stores, lumberyards and home-improvement dealers.

New Heat Treatment For Alloy 7075 Introduced

A new heat treatment has been developed for high strength wrought aluminum alloy 7075. It virtually eliminates stress corrosion cracking.

Developed by Alcoa Research Laboratories, the new thermal treatment—designated -T73—greatly increases the alloy's ability to withstand, without cracking, high, sustained, surface tension stresses. Such surface forces can combine with corrosive attack to cause stress corrosion cracking, a problem affecting high strength alloys of all commonly used metals.

According to Dr. Kent R. Van Horn, Alcoa director of research, the new temper has been developed for use in applications where alloy 7075 undergoes high, sustained, surface tension stresses perpendicular to the grain flow.

"Tests conducted both by Alcoa and its customers," Dr. Van Horn stated, "show that alloy 7075-T73 withstands sustained surface tension stresses equal to 75% of its yield strength, without developing stress corrosion cracking. This applies to all sustained surface stresses, regardless of their directions with respect to grain flow."

The new -T73 temper is a supplement, not a replacement, for the -T6 temper. Where high sustained surface tension stresses are not encountered in a transverse direction, alloy 7075-T6 remains the optimum choice, because of the greater tensile strength afforded by the -T6 temper.

Guaranteed mechanical properties for thicknesses exceeding three inches, and for other wrought products, are subject to special inquiry. The fatigue strength of 7075-T73 is approximately the same as for 7075-T6, and fracture characteristics are slightly superior.

The -T73 temper, for which a patent application has been made by Alcoa, is included in Specification MIL-A-22771, issued by the Bureau of Weapons. A policy for issuing licensing agreements has been established by Alcoa.

Alloy 7075 die forgings and rolled rod and bar are available commercially in the new -T73 temper. The following minimum mechanical properties have been established for sections three inches and less in thickness:

Product	Test Direction	Tensile Strength psi	Yield Strength psi	Elong. % in 2″ or 4D
Die forgings	Parallel to predominant grain flow	66,000	56,000	7.0
	Not parallel to predominant grain flow	61,000	52,000	3.0
Rolled rod bar	Longitudinal	66,000	56,000	10.0

Men-on-the-move

Aluminium Limited Sales, Inc., nounced the appointment of **James Wells** as manager of wrought ingot s Wells' responsibility will be for sales of Alcan extrusion and sheet i in the U. S. He has been associ with the Aluminium Limited grou companies for over 14 years.

Aluminum Co. of America name **Colin Smith** director of Alcoa of tralia Proprietary Ltd., a comp formed last June to establish and o ate a $100 million aluminum com on that continent. Smith, an Alcoa eran, had been New York district manager since 1955.

D. H. Warner, Aluminum & M nesium, Inc., Sandusky, Ohio, has b elected president of the Alumi Smelters Research Institute. **R. K. A dale,** William F. Jobbins, Inc., Aur Ill., is the new vice president, and **M. Baumann,** Federated Metals D of American Smelting & Refining Alton, Ill. is treasurer.

Louis Lippa has retired as presi of Apex Smelting Co. and **William Bayer** has been elected president succeed him. Lippa has been with A for 38 years and had been presi since 1955. He remains as a direc Bayer, associated with Apex in var capacities for the past 24 years, r recently as secretary-treasurer, will tain the position of treasurer. **Fritz N baum** has been named to the ne created post of chairman of t executive committee. **Erik Windm** has been named secretary, succeed Bayer.

E. W. Bliss Co., Canton, Ohio, appointed **James L. Chase** sales mana of container machinery. Chase was merly manager of the Press Div'n's troit District office.

Ralph H. McDonald has been na assistant district manager of Peter Frasse & Co.'s New York sales dist He has been with the steel and alu num distributor since 1926.

Kerns United Corp., Calumet C Ill., manufacturer of specialized m working lubricants, has named **Ru W. Kenyon** vice president of sales. appointment fills the post left vacan **Bruce W. Glenn** who was rece named president of Kerns Lubric Ltd., Toronto, a newly-formed Canad company. Kenyon has been with K for 17 years; had been general s manager.

James M. Morris has been na executive vice president, and **James Case** has been named vice presi in charge of sales at Nichols Wir Aluminum Co., Davenport, Ia. Mo

allurgical engineer, joined Nichols 53 and became plant manager in Case came to Nichols in 1950 and ales manager for the mill division 1959 until his promotion. **L. G.** r was named sales manager of the division, and **R. L. Kammer** mar- g manager.

trobe Steel Co., Latrobe, Pa., pro- of tool, die and specialty steels, named **Joseph W. Collier** manager roduction. He had been chief in- rial engineer at the plant.

rectors of Magnus Chemical Co., wood, N. J., have elected **W. M.** pbell chairman of the board and **H. Peterson** president. Campbell ded the company in 1921, guiding growth to the point where today s manufacturing and sales activities 5 foreign countries and export sales additional countries. Peterson, as- ted with Magnus since 1947, be- es the company's chief executive er.

rnon G. Kneeskern has been named ral manager of Reynolds Metals reduction division. He succeeds es C. Black, reduction division man- for the past seven years, who has ed.

our Reynolds Metals Co. aluminum action specialists have joined the of Reynolds International, Inc., special foreign assignments; they **Franklin D. Bressler,** superintendent Reynolds' reduction plant at Corpus isti, Tex.; **Richard E. Cole,** manager the Massena, N. Y. plant; **Lester Russell,** superintendent at Massena; **Gordon E. White,** formerly super- ndent at Reynolds' Troutdale, Ore. t. **Henry W. DeJong,** Massena plant ineer succeeded Cole as manager of reduction plant.

ive Reynolds sales executives have n elected vice presidents by the pany's board of directors. They are: **T. Ingram,** general sales manager Reynolds Metals Co. and a vice presi- t of Reynolds Aluminum Sales Co., ubsidiary; **Keith Hall,** general man- r of industrial market sales; **Charles Mapes,** general manager of Reynolds s Co.; **Paul Murphy,** general man- r of packaging market sales; and **H. Williams,** general manager of ar- ectural and building products mar- sales.

Volverine Tube Div'n of Calumet Hecla, Inc., Allen Park, Mich., ap- nted **Howard J. Luetzow** manager cial product sales. Formerly a tech- al sales representative and special tals sales supervisor, he will now con- trate on the promotion and sale of nium, zirconium and other special tals. Luetzow had been with Argonne tional Laboratory as a metallurgical earch engineer.

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ALUMINUM SHEETS

Pounds	Gauge	Size	Alloy	Price
10,000	.020	36 x 96	3003-H14	.43
10,000	.032	36 x 96	3003-H14	.42
5,000	.032	36 x 96	5052-H32	.485
5,000	.040	36 x 96	3003-H14	.415
5,000	.040	36 x 96	5052-H32	.42
10,000	.050	48 x 144	5052-H32	.455
10,000	.063	48 x 144	6061-T6	.48
10,000	.090	48 x 144	6061-0	.445
13,000	6"	48 x 96	Tooling Plate	.45

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ALUMINUM ROUND ROD

Pounds	Size	Alloys	Price
10,000	1/4	2011-T3	.51
10,000	3/8	2011-T3	.50
5,000	3/8	2017-T4	.55
3,000	3/8	2024-T4	.55
5,000	1/2	2011-T3	.50
5,000	1/2	2017-T4	.53
5,000	5/8	2017-T4	.53
5,000	5/8	2024-T4	.55
5,000	3/4	2017-T4	.52
10,000	1	2011-T3	.51
5,000	1	2017-T4	.50
10,000	1 1/2	2011-T3	.47
10,000	2	2011-T3	.47

ALUMINUM HEXAGON ROD

2,000	5/16	2011-T3	.60
2,000	3/8	2011-T3	.59
2,000	7/16	2011-T3	.58
2,000	1/2	2011-T3	.58
2,000	5/8	2011-T3	.58
2,000	3/4	2017-T4	.58

ROUNDS • SQUARES • RECTANGULARS • ALL DIAMETERS • ALL ALLOYS

BRASS TUBE (70/30 1/2H)

Pounds	Size		Price
2,000	5/16 x .040		.50
2,000	5/16 x .050		.50
3,000	25/64 x .040		.50
2,000	3/8 x .020		.60
3,000	29/32 x .064		.50
1,000	5/8 x .040	Prepolished	.65
4,000	3/4 x .020		.60
2,000	3/4 x .040		.50

SOFT BRASS CIRCLES (70/30)

Pounds	Size	Price
3,000	.020 x 6 3/4"	.45
5,000	.020 x 7"	.45
8,000	.023 x 13"	.45
3,500	.025 x 14"	.45
7,000	.025 x 15"	.45

SOFT BRASS COIL (70/30)

Pounds	Size	Price
14,000	.015 x 8 1/2"	.46
29,000	.015 x 4 1/4"	.46
3,000	.020 x 7"	.45
2,000	.020 x 14"	.45

SOFT COPPER CIRCLES

Pounds	Size	Price
8,000	.020 x 7"	.45
5,000	.020 x 10 1/2"	.45
4,000	.020 x 11"	.45
1,000	.025 x 12"	.45
1,500	.025 x 14"	.45

COPPER SHEETS

Pounds		Size		Price
10,000	16 oz.	30 x 96	ANN.	.45
2,000	16 oz.	36 x 96	ANN.	.45
7,000	20 oz.	36 x 96	LCR.	.44
15,000	32 oz.	30 x 85	LCR.	.53
7,000	32 oz.	32 x 84	LCR.	.53

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YOU CAN COME IN FIFTH

OVERALL RANKING OF MAGAZINES
in a comprehensive reader preference study
conducted this fall by AMCHEM PRODUCTS, Inc.

NAME OF MAGAZINES	READ REGULARLY	PAGE RATE	CIRCULATION
IRON AGE	1,034	$ 850	59,720
STEEL	859	880	53,025
BUSINESS WEEK	699	3,905	374,391
PRODUCT FINISHING	459	295	24,647*
MODERN METALS	**262**	**405**	**15,169**
PRODUCT ENGINEERING	240	895	48,426
PURCHASING	229	792	27,350
DESIGN NEWS	222	900	49,050
PLATING	214	295	8,800
MATERIALS IN DESIGN ENGINEERING	206	851	28,793
AUTOMOTIVE INDUSTRIES	200	550	30,772
MACHINE DESIGN	191	1,020	53,900
DUN'S REVIEW & MODERN INDUSTRY	168	1,600	121,616
PRODUCT DESIGN & DEVELOPMENT	151	2,250	50,586
METAL PRODUCTS MANUFACTURING	134	475	15,214
PURCHASING WEEK	132	725	18,409
APPLIANCE MANUFACTURING	124	625	16,550
CORROSION	122	360	8,121
AVIATION WEEK	109	1,550	81,980
WESTERN METALWORKING	50	425	9,267
SPACE AERONAUTICS	47	1,125	56,121
WESTERN AVIATION	17	600	20,027
OTHER	510		

*Pocket size
SRDS . . . Oct. 61

...and still be the winner!

Modern Metals did this fall when Amchem Products, Inc. (manufacturer of finishing compounds) asked 5,200 of its customers and prospects what magazines they read, which they consider most useful, etc. The ranking of magazines mentioned in survey replies is related to advertising rates and circulation in the table on the facing page.

OTHER FINDINGS:

Modern Metals was voted the "most useful" magazine by aluminum fabricators by a hefty 2-to-1 margin over the runner-up in this category.

Modern Metals received more "most useful" votes from aluminum fabricators than Iron Age, Steel and Product Finishing combined.

Modern Metals finished first in "total mentions" from aluminum fabricators, and ninth in "total mentions" by steel fabricators.

Modern Metals finished fourth in unduplicated readership of industrial magazines, despite the fact that aluminum fabricators were outnumbered 2-to-1 by steel fabricators.

THE MORAL:

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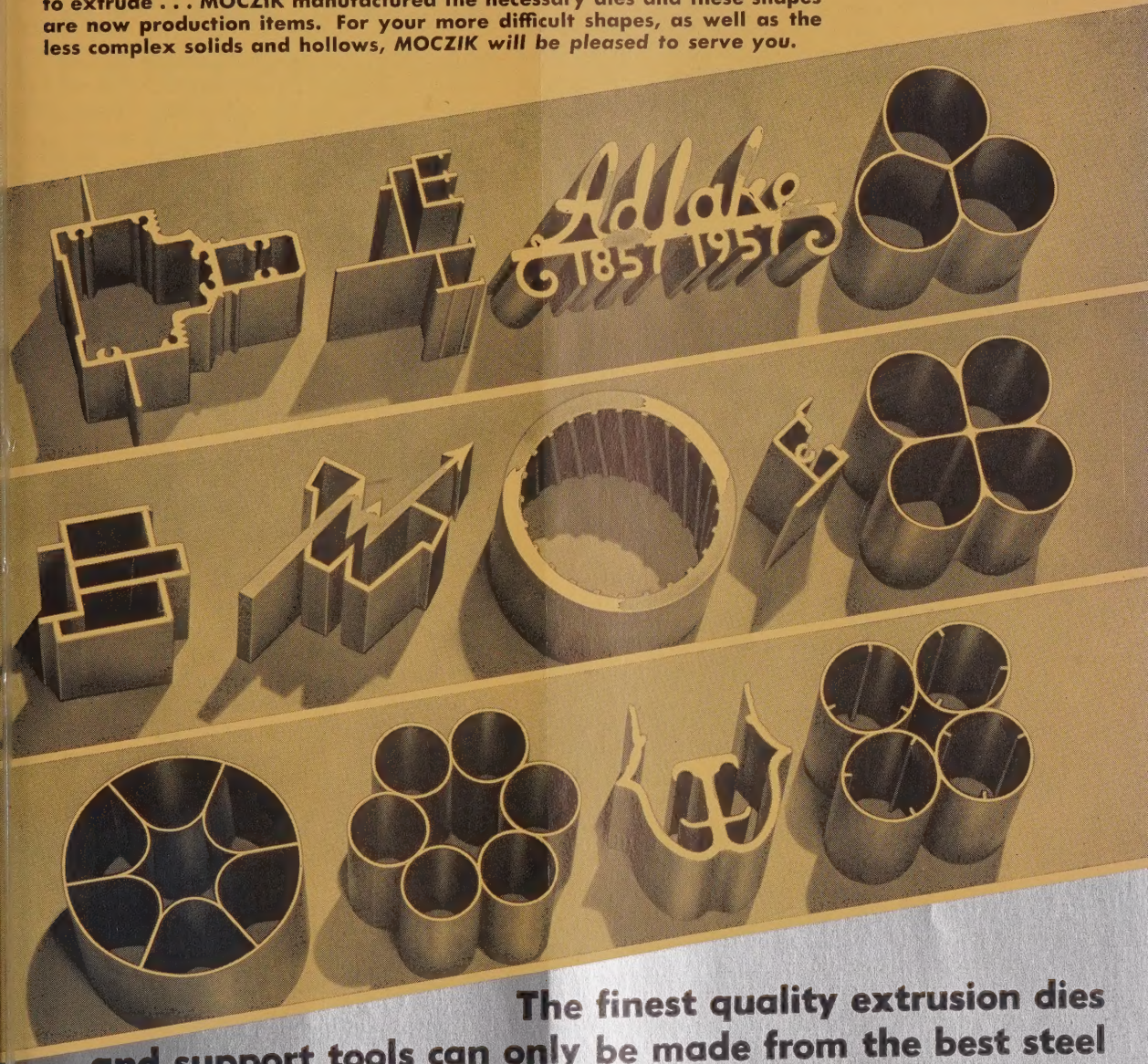

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Looking Ahead

Kaiser Aluminum and British Aluminium Co. made news this month with the announcement that their joint research project had developed a basic improvement in reduction cell design that could bring an appreciable cut in the cost of producing aluminum (see page 83). By inserting titanium diboride bars in the floor of the cell, electrical resistance is reduced. This can result in either a 15% increase in output per cell or a decrease in the amount of power needed to produce a pound of metal. If put in effect, the improvement could mean a substantial expansion of capacity at a very modest cost.

Both Kaiser and British Aluminium are said to be using the process in portions of their primary facilities. The development is protected by patents in most of the major aluminum producing countries. The basic idea is credited to scientists of the British firm; Kaiser joined in the development in the mid-1950's. Both Reynolds and Alcoa are known to be working on similar projects.

An even bigger increase in potline efficiency may result from another of Kaiser's research projects. This one involves the use of lithium fluoride as the electrolyte, and it may boost cell efficiency by 40% or more. There has been no indication as to whether the joint use of the two improvements would add up to a 55% increase in efficiency, but even half of that amount would be of enormous significance to the industry – and a sobering thought for other basic materials industries. Consider the markets that would open up to 15-cent aluminum ingot!

This month's cut in the price of aluminum extrusion ingot should not have any significant effect on the price of extrusions, but it may well depress the aluminum scrap market and could be cause for concern among some independent suppliers of billets – notably the secondary smelters. Outsiders – in financial circles, for instance – will probably see it as another sign of weakness in the aluminum industry.

Kaiser Aluminum started it by announcing that effective December 7 it would restore the cent-per-pound no-toll allowance on extrusion ingot. In other words, independent extruders who do not return scrap to their primary suppliers will get a penny-a-pound discount. Kaiser also made "minor price adjustments" on individual extrusion ingot alloys, amounting to two-tenths of a cent. Thus, the price of 6063 alloy extrusion ingot (not homogenized) was dropped from 25.5 cents to 25.3 or to 24.3 cents if no scrap is returned. The scrap allowance had been abolis just three months earlier during the wav price cuts that lowered the basic price of minum 2 cents to 24 cents a pound. The o primary producers quickly matched Kai action.

Restoration of the toll allowance will tend to d the extruder from returning scrap to the b supplier. He can get as big a saving by buy new billets and taking the 1-cent discount. Kaiser phrased it, "This allowance more ne reflects the current market value of scrap w is accepted for toll conversion to billet." toll deal is supposed to apply only to sc originating from billet bought from the prim producer, and it is limited to no more t 25% of the weight of the original sale. Bu is well known that some extruders have "r ed" the scrap market for material to toll, t tending to bid up the price of scrap.

So extruders now have a slightly more comforta spread between their raw material costs and "going" price of extrusions – whatever that Of course, the suicidal urge to cut prices force some outfits to shade their prices ag making it harder for firms that are interes in making an honest buck. But it is also t that the producers have not set a good exam as far as pricing practices are concerned. T pay too much for tolled scrap, anyway—up 4 cents over the market price. It amounts t "hidden" discount, and it saddles the produc with an awkward scrap handling setup. It w be interesting to see if a similar concession offered to independent sheet rollers.

Aluminum shipments should top off at about 2.4 m lion tons this year – a 3% gain over 1960, a just a shade under the record 2,480,000 t shipped in '59. That's how Reynolds Met sums up the year, adding that shipments to U customers jumped about 10% over the 19 rate, while exports skidded 50%. The big g in domestic shipments came in the closi months of the year, and all signs point to a c tinuing upward trend in '62.

New records in both production and shipments shou be racked up next year. Primary output will over the 2 million ton mark, and shipments both domestic and exports – could easily exce 2.7 million tons. This will relieve some of t pressure on prices and brighten the profit p ture for producers and fabricators alike. Fir that supply materials, equipment and servi to the aluminum industry will benefit direc in terms of new customers and increased sa to present clients. But there's no cause for co placency; competition will still be stiff. So fast your girdles; '62 is bound to be a free-for-all.

—The Edit

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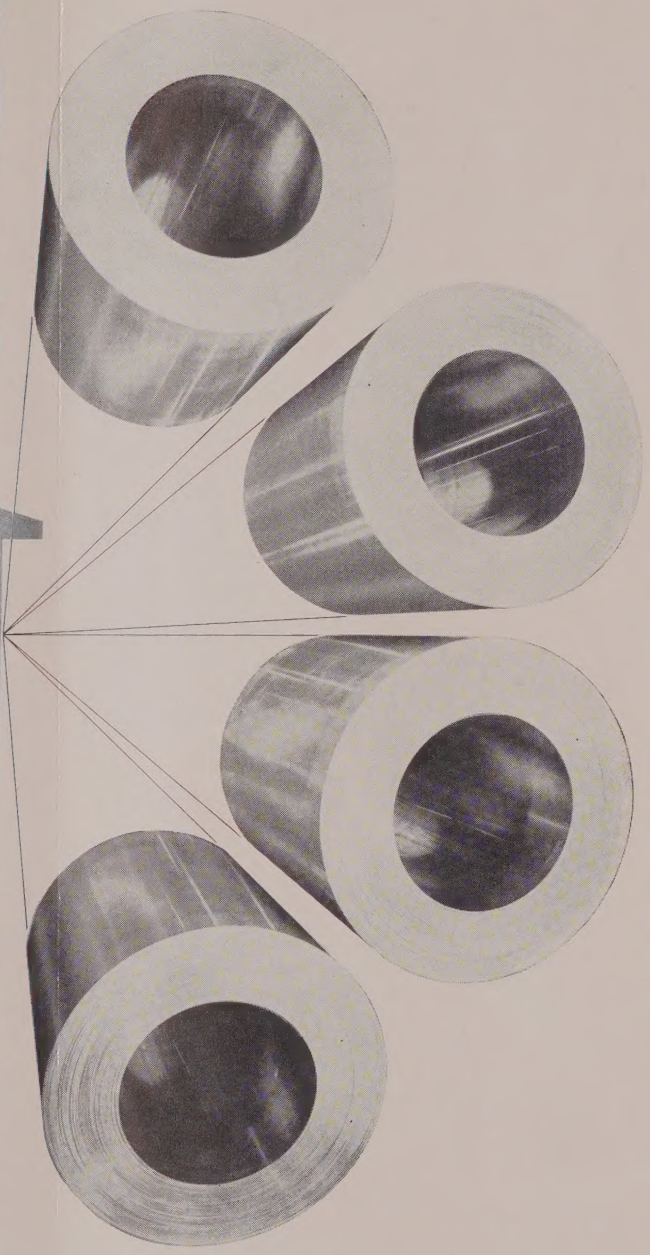

Expansion of Conalco's sheet aluminum plant is nearly complete. This will bring a 400% increase in Conalco's output of sheet aluminum for the market. The expansion has also broadened Conalco's product line. Tension roller leveled sheet for siding and lithographic plates is already streaming from Conalco's new equipment. Bright finished stock for special uses will soon be available. All Conalco aluminum will continue to be produced in the "climate of quality" that has built this company's reputation as a leading manufacturer of highest quality foil and super purity aluminum. If you would like to have further information about Conalco as a dependable source of aluminum, the sales offices are listed below.

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